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Supplement to ELECTRICAL WEST, March 1, 1931

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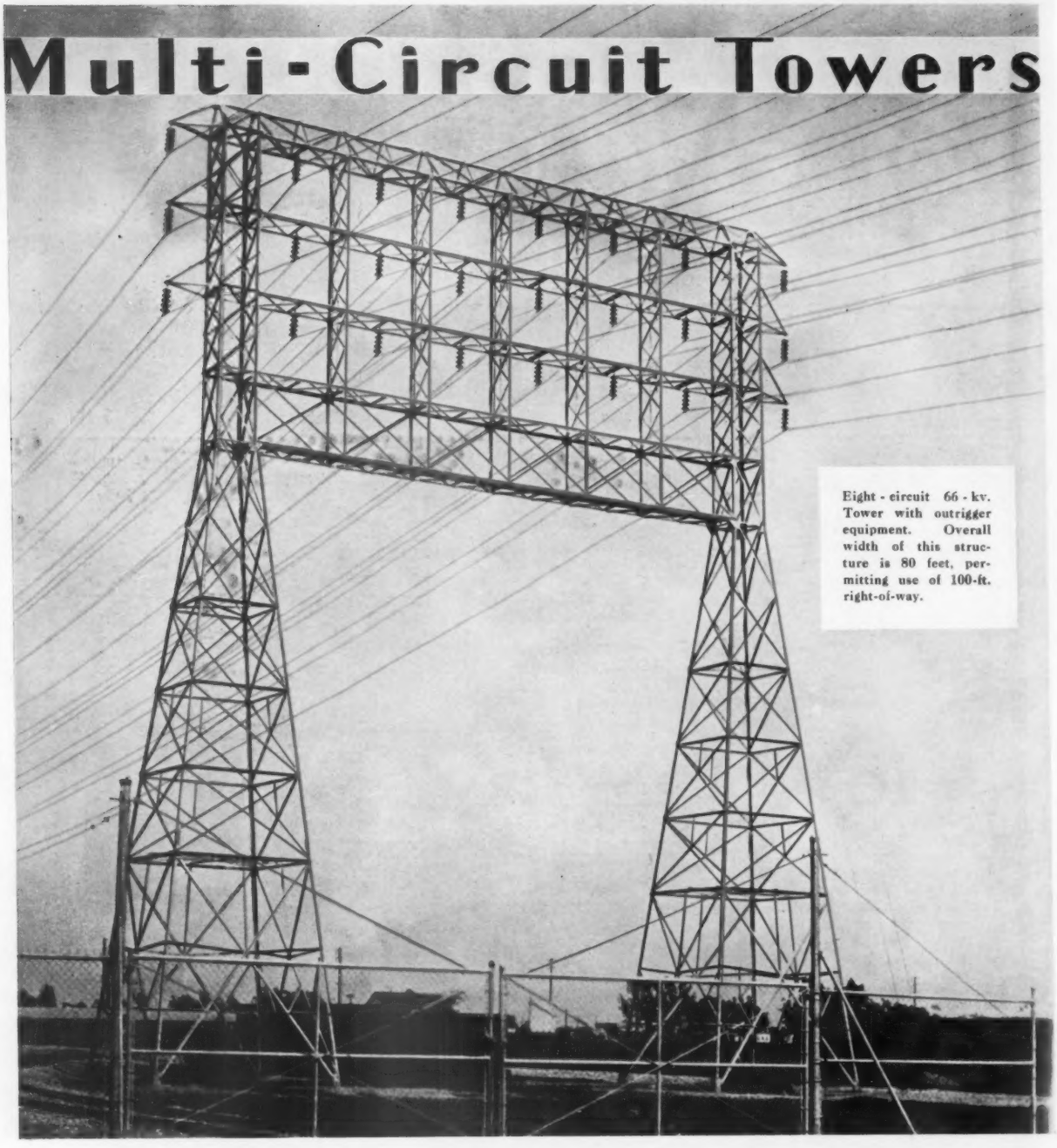

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ELECTRICAL WEST, entered as second class matter at the post office at San Francisco, under the Act of Congress, March 3, 1879. Published at 883 Mission Street, San Francisco, California, thirteen times a year as follows: January 1, February 1, March 1, April 1, May 1, May 15, June 1, July 1, August 1, September 1, October 1, November 1, and December 1.

ELECTRICAL WEST

With which are consolidated the "Electrical Journal," the "Journal of Electricity, Power & Gas," and the "Journal of Electricity"

A McGraw-Hill Publication
Established 1887

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Volume 66 | April 1, 1931 | Number 4

McGraw-Hill Company of California

883 Mission Street
SAN FRANCISCO

NORTHWEST OFFICE
1206 Spalding Building
PORTLAND, OREGON

SOUTHWEST OFFICE
632 Chamber of Commerce Bldg.
LOS ANGELES, CALIF.

Publishers of
ELECTRICAL WEST

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WASHINGTON, National Press Building
CHICAGO, 520 North Michigan Avenue
PHILADELPHIA, 1600 Arch Street
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NEW YORK, 285 Madison Avenue
DALLAS, 303 Thomas Building
DETROIT, 2-257 General Motors Bldg.
GREENVILLE, S. C., 1301 Woodside Bldg.

Subscription rate in the United States and possessions, Canada, Mexico and all countries included in the U. S. Postal Union, $2 per year, two years $3; elsewhere $3 gold (13 shillings), two years $5. Single copy, 25 cents. When change of address is required, both old and new addresses must be given. Notice must be received two weeks before change takes place.

Member Audit Bureau of Circulations
Associated Business Papers, Inc.
Circulation of this issue, 6,700

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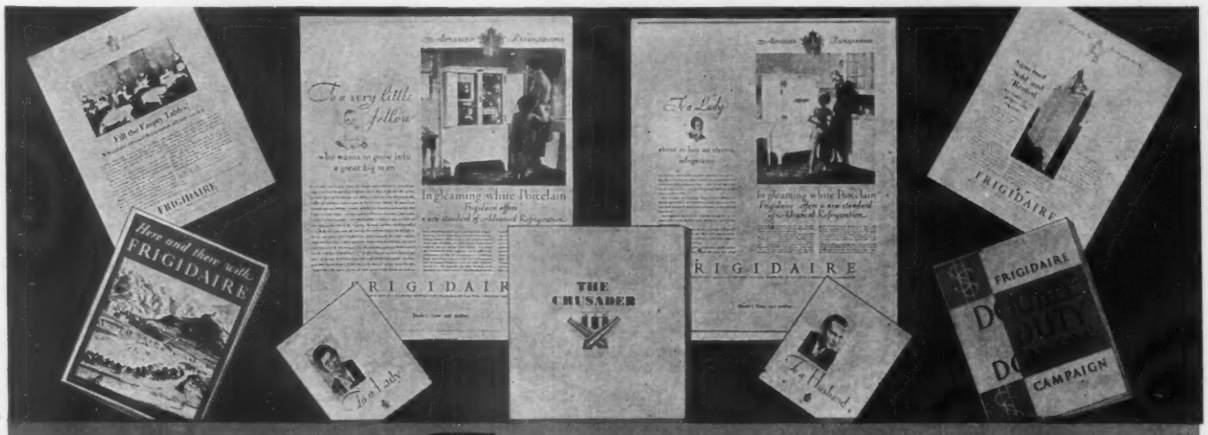

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San Francisco, April 1, 1931

Volume 66
Number 4

G. C. TENNEY, *Editor*

UNCLE SAM let the contract for building Hoover Dam to six Western contractors, and they are already digging up the desert to erect a town from which to operate. Meanwhile, the legal dam which Arizona wants to throw across the stream of this project's progress has not seemed to hold water.

▼

OREGON'S Legislature has substituted a one-man dictatorship for a three-man public utility commission and has written down which way he is to lean. It has also negated the principle of "public convenience and necessity" and given every city council a chance to juggle its own rates. Thus is sound regulation replaced by political domination. Public utilities have the last resort—the courts.

▼

IN SEATTLE the municipal pot is aboil over the dismissal of J. D. Ross by Mayor Edwards and the subsequent repudiation expressed in the voting support given the ex-lighting department chief's engineering department amendment.

▼

NEVADA'S dealers importuned their legislators to submit a bill divorcing merchandising from utilities. Though passed by the assembly, the Senate killed the bill. It is similar in text to that being sponsored in a dozen state capitols.

▼

TWELFTH unit of Edison's Long Beach plant will soon be started by Stone & Webster, who received the contract for the job.

The Month

BEST antidote for the anti-utility merchandising virus, so fast spreading, is the immediate injection into current practices of some of the policy prescriptions written in consultation by a joint board of merchandising doctors and reported here. (See page 172.)

▼

PARADOX is outdone by the reversing of a refrigeration cycle of operation to produce heat, especially with theoretical efficiencies of as high as 500 per cent. The process is the focus of all eyes since it holds such commercial possibilities. (See page 177.)

▼

INDUSTRIAL plants show every sign of extreme susceptibility to modernization, especially if new electrical shortcuts to production offer real advantages. Wisely the motor and control men plan to heighten the desire and develop their own markets thereby. (See page 184.)

▼

CHEWING Gum Tycoon Wrigley has used light lavishly in decorating his Catalina Island casino which overlooks the submarine gardens of Avalon. (See page 190.)

Editorial

Regulation of Trade Practices

COMPETITION has created more evils than its value as a medium of keeping prices low to the consumer can ever justify. In fact, some forms of competition have proved more the death than the life of trade. Yet, under present laws, no co-ordinated group action to regulate competition is legal. This in spite of the fact that if a group of competing units incorporates as a consolidated company, regulation of price, practice, and other factors otherwise illegal if practiced by independent merchants, is legalized.

However, in co-operation with the Federal Trade Commission, an industry may call a conference in which legal definitions of fair practice are set down and the enforcement machinery is started.

In two groups of the electrical industry where competition has been most vicious, these trade practice conferences are being called. The Electragists last month met in Kansas City to devise fair trade practice definitions for the electrical contracting industry. Soon the electrical wholesalers hope to hold a similar conference to define fair trade practices in jobbing.

The electrical industry at large should lend every support to these movements that seek sound, ethical self-regulation. Every job of regulating that the electrical industry can do of itself puts off the day when government regulation will be thrust farther upon it. Private business certainly should be able to submit to its own private regulation.

California Announces Some Merchandising Principles

THAT trade relations within the industry are improving cannot be denied. A general realization is developing that the problem which has stirred up such a storm is not so much a question of the fundamental principle of whether or not utility companies should merchandise as it is a matter of correcting abuses that may have grown up in utility merchandising practices.

Indicative of progress, in so far as California is concerned, is the report of merchandising principles announced by the Pacific Coast Electrical Bureau and published elsewhere in this issue. There are few power companies that cannot subscribe to these.

The Bureau's report is based upon criticisms of practices submitted by contractors, dealers, and merchandisers generally. These criticisms were supplemented by actual field investigations plus friendly discussions of various objections raised against power company practices. The report does not represent anybody's theory.

The editors of ELECTRICAL WEST know from experience that no commercial or merchandising manager can sit in his office and work out a theoretical sales program satisfactory to other merchandisers in the communities which his company serves. The editors recommend that this commercial manager put on his hat and walk down Main Street, interviewing dealers, getting their viewpoint, suggestions, criticisms. If he cannot do that, then he can solicit such information by letter. Or he can find out what criticisms are uppermost by any method that he pleases. He must find out. Perhaps a hardware dealer will show him the questionnaire recently circulated by the National Retail Hardware Association asking fourteen pertinent questions relating to power company merchandising.

When this is done it will be possible to develop that co-operation so essential if the great domestic market is to be developed. What is needed now more than ever is a united industry front. It will come with a set of merchandising principles to which every branch of the industry can subscribe. California appears to have them.

Radio Interference And Merchandising

ONE PHASE of the radio-interfering type of electric appliance which has not yet been given sufficient consideration is that of the inconsistent position in which the light and power company is placed by it.

If the merchandising department sells an electric device which, when operating, causes radio interference, the customer who complains about the interference goes through this experience. A radio interference man from the operating department comes out to clear the trouble. His investigation leads to the offending appliance. He points out that the use of the appliance will cause interference noise in the entire neighborhood. To this the customer says, "But I bought it from your own company. Why do they sell such appliances? Surely of all people they ought to know better."

Thus it is not only the employee who is in an embarrassing position, but the company as well.

Manufacturers of appliances declare they will not incorporate condenser equipment in their appliances until convinced that public demand is sufficient to justify the expense. The utility and dealer must reflect this public demand back to the manufacturer lest appliance selling become more boomerang than blessing.

A One-Man Commission

OREGON legislation is nothing if not original. Wanting to correct utility practices in the worst possible way, this state's legislators seem to have chosen to do so in the worst possible way. Dissatisfied with the utility regulating commission of three men, they decided to be only one-third as dissatisfied by having only one man for their commission. This amazing step forward in democracy seems to have landed the state back three steps into dictatorship.

The position of public utility commissioner ought to be highly ornamental, even if it is not designed to be useful. Feeling that the former commission seemed to favor the utilities once in a while, when they were right, Oregon's lawmakers made sure it would not happen again. They wrote specifications for the new man. He must favor the public, right or wrong. Then to make sure he does so, the bill takes from him all power to do anything else.

Individual city councils can now juggle with the rates as they love to do. Of course they will never seek unfair preferential rate advantages over their rival cities. All the commissioner can do is advise. His specification on advising is not cluttered up with requirements of fairness or good judgment. Such qualities might cramp his style. Must he not advise against the utilities? So it is written.

If the poor chap is afflicted with long-range views of things and advises for the good of the state at large versus a single city's desire for preferential rates at the expense of other communities, imagine his embarrassment, not to mention his political career. Nothing in the law makes it necessary for the expert authorities which constitute a city council to pay attention to his advice anyway, so it hardly matters. Who is the commission, anyway? He is only one man, and any city council has six.

Comic opera government! High comedy lawmakers singing chorus to a municipal ownership governor, advocating government in any business but dry-goods. What mischievous boss could have designed a surer method of driving the utilities of a state perpetually into the courts? On the other hand, if the utilities continue to be harassed, who can blame them if they curtail their investment and development? The law of self-preservation somehow transcends the grotesque laws of man.

Long Term Commercial Planning Is Needed

"THOSE concerned with the production and distribution of goods and services . . . . should have a larger measure of leadership in business policy to insure sound and lasting prosperity. This leadership can be exercised only by a more deliberate process of long-term planning and organization for the direction and development of business operations."

So states one of the planks in the "Platform for American Business" published as a supplement to the last issue of ELECTRICAL WEST.

Long-term planning is a policy with which the light and power industry is familiar—one on which much of its present development has been based. Additions to generating capacity have followed five- and ten-year schedules. System development, betterment, and modernization are projected two, three, or five years ahead. Similarly, financing of fixed capital requirements follows a definitely projected program.

How about the commercial phases of the business? It is here that opportunity exists for long-term planning. Commercial departments have operated heretofore on a year-to-year basis, budgets having been made up in November or December for the year that was to follow. In almost every instance these are not based upon a study of future possibilities, but upon past performance.

This deficiency has been caused more by lack of facts upon which to base long-term commercial plans than by the undesirability of such a program. What has been wanting has been a survey of potential markets. Is the present trend of growth normal, subnormal, or supernormal? What are the potential markets open to electric service in the future? What effect will changes in the price of electricity have upon these markets? Answers to these questions will permit the commercial managers to set up bogeys, do some long-term planning of their own.

Certainly the industry has profited to date from long-term planning in some phases of its development. And just as certainly further application of this policy to the commercial side will prove equally beneficial.

Establishing a Fair Merchandising Policy

Special Committee Drafts Principles to Govern Power Company and Dealer Responsibilities in Selling Appliances

NO SUBJECT today in the industry is so debated as that concerning merchandising practices and policies of power companies in their relation to dealers. In some instances the subject has passed the stage of amicable or even acrimonious debate and become the target of politics and legislation. Whatever its status in various sections of the West, certainly nothing can result from a mutual exchange of charges and countercharges in which generalities and not fundamentals are hurled back and forth. If any semblance of a sound and satisfactory solution of the problem is to be attained, it must be upon a basis of clear understanding of the principles involved. Whatever policy is finally put in effect to remedy the causes for misunderstanding and heat must be built up on a clear facing of real issues.

It was for the purpose of arriving at just such a clear-headed basis that a committee was appointed by the Pacific Coast Electrical Bureau last year. Results of months of conferences, the clearing of masses of data and reports on various aspects of the situation, the final recommended central station policy on the major points at issue, are presented in the following verbatim report. This report is designed as a guide to the establishment of policy and the setting up of sales practices for all power companies merchandising in the territory of the Bureau. That it represents the boiled down, acceptable basis to all parties should be apparent from the personnel of the committee appointed by the board of directors to draft the report. Each member brought to the problem the interests and the viewpoint of his branch of the business.

Pacific Coast Electrical Bureau

Merchandising Policies

FOUR considerations influenced the Pacific Coast Electrical Bureau to appoint a special committee for the purpose of studying the problem of dealer relations and utility merchandising plans and policies in California. These were:

1. The Bureau's policy to bring about a better understanding of the duties of each branch of the electrical industry to the other branches.

2. The Bureau's aim to cause the individual employees of the manufacturer, wholesaler, contractor, power company and merchandiser to have a better knowledge of their proper attitude toward companies and individuals in other branches of the industry.

3. The Bureau's policy to encourage power companies to conduct their electrical merchandising activities on a basis that will stimulate retail dealers and contractors of their respective territories to become more active and progressive in promoting better and more extensive use of the services of the electrical industry.

4. The Bureau's policy to promote continued development of the electrical industry by educational methods, fostering good ethical business standards and improved service to the public.

The board of directors appointed a special committee for this purpose, consisting of the following: H. M. Crawford, chairman, Pacific Gas and Electric Company; Glen Arbogast, president, California Electragists; R. G. Kenyon, Southern California Edison Company; H. H. Courtright, Valley Electrical Supply Company; and K. I. Dazey, managing director, Pacific Coast Electrical Bureau.

This committee held several meetings from August to November, inclusive, 1930, and presented its report to the Electrical Bureau in November, 1930. Appreciating sincerely the fine work which was done by this special committee, the board of directors of the Pacific Coast Electrical Bureau adopted the following recommendations, based on this committee's report and consistent with the foregoing outlined policies:

1. Uniform Standard for Range Wiring

The Bureau is in thorough accord with the adoption of a uniform standard for range wiring where local ordinances permit. We have been assured of the hearty co-operation of the contractor-dealer group and of the Pacific Coast Building Officials Conference in bringing about a uniformity of local ordinances.

This particular problem of uniform standard is one in which the entire industry is interested, and the plan should have united support.

* * * *

2. Range Installation Prices

The Bureau does not feel that it should be charged with the responsibility of the adoption of a uniform minimum range installation price, because of variability of conditions and differences in ordinances. Furthermore, this is a question of individual company policy.

The Bureau does, however, strongly urge that each power company for itself adopt a uniform price in each of its districts or in each territory where conditions of installation are comparable, this uniform price to be based on actual cost of labor and material plus a fair allowance for overhead and profit. The adoption of such uniform installation prices would enable the salesmen of the power company to quote definite figures when presenting range proposals to customers, and consequently facilitate range sales. It would also avoid misunderstandings, confusion, and customer discontent which oft-times ensue from the quotation of estimated prices. Con-

sequently, we believe the adoption of this practice by individual power companies would make for better and more satisfactory service to their customers.

* * * *

3. Distribute Range Wiring Business to Established Dealers

The Bureau is of the opinion that the established contractor-dealer is entitled to the support not only of the power company but of the jobber as well. We recommend that the power companies in placing wiring business give every possible consideration and preference to the established contractors and dealers who are actively promoting high ethical standards, and adequacy and quality of electrical wiring. Our recommendation in this instance is based upon the conviction that if the electrical contractor-dealer branch of the industry is conducted upon a highly ethical and profitable basis and is given the support which it should have, it will be so strengthened that it will have greater ability to promote the welfare of the industry through improved service to the public.

* * * *

4. Quoting Prices on Wiring

Again to avoid misunderstanding, confusion, and customer discontent which frequently follow the quotation of estimated prices for range installations, we believe that where power companies do not adopt the uniform installation prices suggested in paragraph "2," but turn the installation over to be handled direct by contractors with the consumer, prices should not be quoted until the authorized quotation is secured from the electrical contractor who is to do the work.

* * * *

5. Allowances on Old Ranges

The Bureau is in accord with the discontinuance of exorbitant allowances, although it recognizes that in meeting certain types of competition this practice may sometimes be forced upon the industry. The Bureau believes, however, that where such conditions necessitate large allowances, the power company in making them should give every possible consideration to the position of the dealers.

* * * *

6. Installment Sales

All responsible dealers are in a position to finance their own installment contracts and it cannot be expected that the power companies should extend financing terms to dealers who, because of their lack of responsibility, are unable properly to finance their installment contracts.

The Bureau recommends that the power companies should continue to adhere to standard commercial practice in the carrying of installment contracts.

* * * *

7. Dealers' Appliance Prospects

It would appear to the Bureau that through previous misunderstandings, a mutual distrust on the part of the dealers' and the power companies' representatives had arisen. We believe unqualifiedly that the dealer's position should be recognized on an ethical basis in connection with legitimate prospects, including Red Seal applications, which he may develop and file with the power company. This, we are confident, will do much to re-establish a mutual confidence and a beneficial relationship.

* * * *

8. Industry Co-operation

The Bureau feels that it would be derelict in its duty if it did not urge upon the commercial leaders in the entire industry the necessity for the re-establishment and maintenance of the former close personal contacts which existed among the various groups composing the electrical industry. We recognize, of course, that with the growth of the industry, these close contacts have become increasingly difficult, but we also feel that much of the past misunderstanding is directly attributable to the lack of these intimate contacts.

It is the opinion of the Bureau that much of this misunderstanding has arisen through lack of co-operation, and we cannot urge too strongly a close bond of fellowship between the district and division representatives and the sales organization of the power companies and the local dealers. In this connection, it is extremely gratifying to note that considerable progress has already been made along these lines. We feel, however, that we cannot stress too strongly the necessity for continued contact and co-operation between the two branches of the industry.

The Bureau plans to continue its activities, which will help toward the accomplishment of this much-to-be-desired result.

Foremost among these is the plan of having group meetings periodically for the purpose of personal contact and interchange of common problems.

* * * *

9. Inform Dealers in Advance of Major Merchandising Programs

We believe that representative dealers in electric appliances should be informed in advance of the actual carrying out of merchandising plans. Through this means the power companies will be enabled to secure a wholehearted co-operation on the part of the dealers, and the latter in turn will be enabled to participate fully in such merchandising plans to the mutual profit of both the dealer and the power company.

* * * *

10. Salesmen's Compensation

The question of sales compensation has received the careful thought and study of each member of the Bureau. Initially, we had hoped to be able to submit a general recommendation which would solve this problem satisfactorily. Both research and discussion, however, made it highly apparent that because of variations in local conditions the establishment of any specific plan to apply throughout the entire system of any one of the power companies was not practicable. For this reason it became obvious that it would be increasingly difficult to attempt to establish a standard basis of compensation which would apply to the entire state.

The Bureau feels, however, that much of the past misunderstanding throughout the entire country has arisen because of the fact that the income of power company salesmen is either partially or entirely dependent upon volume of merchandise sales in dollars and cents, and that because of this condition it has been difficult to exercise a satisfactory control over salesmen compensated on this basis.

Recognizing the impracticability of adoption of a statewide basis of compensation for salesmen, and at the same time realizing the unfair competition frequently resulting from the commission form of compensation, we urgently recommend the following:

(a) *That the sales plans and policies of each California utility conform to ethical, constructive merchandising methods, on such a basis as will encourage sales activities of electrical merchandise dealers.*

(b) *That the compensation of utility salesmen be established on a basis which will encourage their full and hearty co-operation with such electrical merchandise dealers.*

Ruskin Plant Embodies New Engineering Features

British Columbia Power Corporation Completes Final Link in Chain of Generating Stations Comprising the Alouette-Stave River Hydro System. New Development Designed to Utilize Every Advantage of Strategic Location

By C. W. COLVIN
Electrical Assistant Engineer, British Columbia Electric Railway Company, Ltd.

WITH the completion of the Ruskin power plant on Stave River in British Columbia, the British Columbia Power Corporation has successfully carried out a well engineered hydro-electric program which utilizes every available drop of falling water in the Stave River and Alouette Lake to provide ultimately more than 200,000 hp. of electrical energy for the benefit of British Columbia power users. Briefly, the waters of Alouette Lake, elevation approximately 140 ft. above the Stave River, are tapped by a tunnel to provide 12,000 hp. at the Alouette plant, the discharge of which flows into Stave Lake, thence into Stave River, the outlet at the southern end of the lake. A few miles down the river a natural hydro site, Stave Falls, was developed to provide 79,000 hp. at approximately 130-ft. operating head. Stave River then continues on its way 3½ miles to the Ruskin dam where the waters of Alouette Lake are used for a third time and of Stave River a second time to provide 47,000 hp. in an initial installation which will ultimately be increased to 188,000 hp. The effective head at the Ruskin development is 123 ft.

Ruskin dam and power house are strategically located in respect to the remainder of the system as they are but 29 miles from Vancouver, the chief load center of the British Columbia Power Corporation's mainland system. It can readily be seen that this plant, operating at approximately the same head and using the same water as the Stave Falls plant, will not, under ordinary circumstances, develop more than 79,000 hp., the reservoir being merely a forebay of 700 acres in area into which the 4,200 sec.-ft. of discharge water from the Stave Falls turbines are emptied. By daily regulation of storage, Ruskin can therefore be a peak load plant but, because of its proximity to Vancouver, may also be used as a standby plant in case of trouble on the remainder of the transmission system. Its ultimate capacity of 188,000 hp. will then be of the greatest value, and may be fully obtained by bypassing the water at the Stave Falls plant.

From foundation to crest, the dam itself is 400 ft. long and 195 ft. high. It is surmounted by seven steel Taintor gates above which a traffic bridge will be constructed. An inspection gallery, which also acts as a drain, runs through the dam from bank to bank and permits an accurate knowledge of seepage. Two of the four penstock tunnels have been drilled through the solid rock of the east bank and connect with 80-ft. lengths of steel penstock 19 ft. in diameter leading to the turbines. Oil-operated butterfly valves are located at the power house end of these penstocks to control the flow.

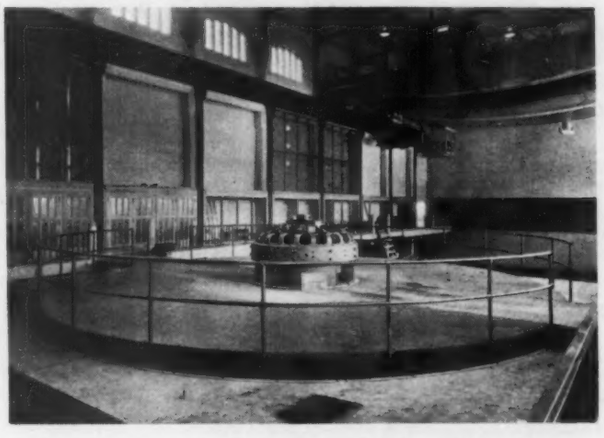


Fig. 2. Construction view of "umbrella" type generator installed in position. Neatness, efficiency, and simplicity are obtained by mounting the top of the generator at the same elevation as the floor. Generator leads are shown on the wall at the extreme left

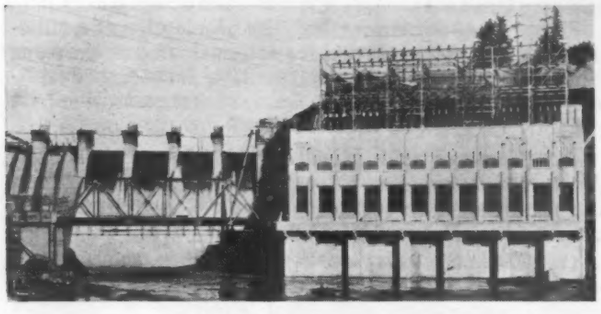


Fig. 1. General view of Ruskin development. Note location of switching structure on power-house roof

Great care in designing both the architectural and electrical layouts of this plant is evidenced throughout. The main building, 172 ft. long and 61 ft. wide, may be described as of modernized Gothic style. These dimen-

sions are suitable for the addition of unit No. 2 at some future date without increase. However, the building can readily be increased in size to include units Nos. 3 and 4 when they are required. The main building houses the assembly floor, north and south galleries, hydraulic control platform, turbine floor, air cleaning, and CO_2 rooms, machine shop, storerooms and lavatories. A north wing 50 ft. long and 48 ft. wide houses the control room and offices, storage battery room, cable room, service room, and transformer vault. As provision is made in this north wing for the future units, no increase to this wing is anticipated. In the "L" thus formed by the main and wing buildings the main transformer yard is located. As a unique innovation in power house design, the outdoor high-voltage bus and switching structures are located on the roof of the buildings, the 68-kv. structure being on the roof of the main building, and the 13.2-kv. take-off structure on the roof of the wing. A more detailed description of this feature is included later in this article. The accompanying illustrations of the dam and

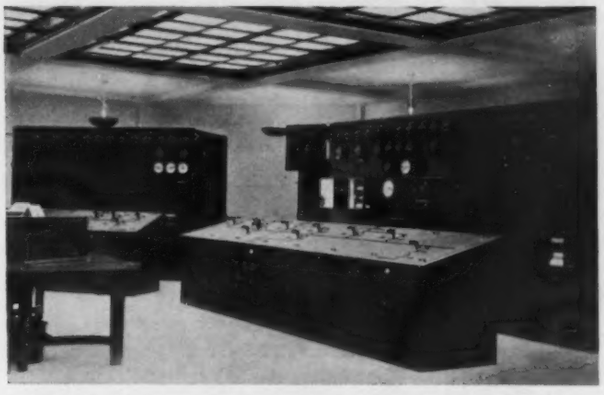


Fig. 3. Interior of control room showing standard bench-boards and panels grouped so as to obtain the advantages of the circular panels. Excellent lighting is provided from the translucent ceiling as well as from inverted lighting fixtures

power house clearly indicate the effort that was made to produce an attractive as well as efficient plant.

The generating unit consists of a vertical shaft Francis-type prime mover, a vertical-type generator, and a direct-connected exciter. The turbine is rated 42,500 hp., 120 r.p.m. at 123-ft. head. Under favorable conditions of head, it will develop 47,000 hp. The steel scroll case is embedded in concrete which is carried up in a barrel-like structure to form the foundation for the generator. The pit thus formed is steel lined, 18 ft. in diameter, and provides for doorways for inspection and air ducts. The liner is extended up to the beam structure at the generator foundation which carries the main thrust bearing. The main turbine guide bearing is of lignum vitae and is carried in the cover plate of the turbine. The generator itself is rated 44,000 kva. at 80 per cent power factor and delivers energy at 13,800 volts, three-phase, 60 cycles. It is of the "umbrella" type, differing from the conventional vertical unit in that its main thrust bearing is below and not above the rotor. The bearing is of the Kingsbury construction and carries the weight of all rotating parts, amounting to almost a million pounds. A generator guide bearing, located in the same pot with the main thrust bearing, is about level with the pole pieces of the rotor, which are lower than the rotor hub due to the drooping of the rotor arms.

At the time of its construction this was the largest generator of its type in the world. As the top of the

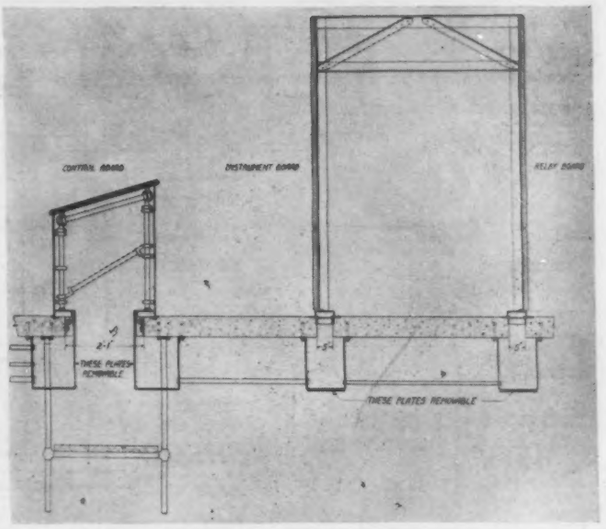


Fig. 4. Cross-section of bench-boards and panels showing the accessibility made possible through the use of floor openings. Platform below the bench-board provides easy method of working on control circuits and facilitates inspection or future changeovers

main generator is at the same elevation as the floor line, the interior of the main generating room is striking in appearance, the only visible rotating part of the machine being the small direct-connected exciter. Furthermore, there is a total absence of control apparatus and switchboards. This radical departure from conventional practice in power plant design produces a commendable effect by emphasizing efficiency and orderliness in plant operation. A pleasing color scheme of light green and black is carried out even to the tile flooring of the galleries, and harmonizes well with the dark green painting of the subgalleries and equipment.

The generator is totally enclosed and is self-ventilated by non-recirculating air. Outside air is drawn through a dry-type purifier and into the machine through self-closing, electric-trip doors. After passing through the machine it discharges into the air casing surrounding the machine and then through another set of self-operated, electric-trip doors to the warm air header, from which it may be directed outdoors or utilized for station heating. In the future, this warm air will also be passed through idle machines, thus obviating condensation therein, a feature which should result in decreased maintenance expense and longer life. Temperature detectors located throughout the machine automatically protect against harmful operating temperatures of its parts; through differential relays and thermostats, CO_2 fire protection apparatus automatically prevents damage to the windings from that source.

Leads from the generator are carried under the north gallery and up through wall bushings directly to the delta bus of the main oil-immersed, water-cooled transformers, of which there are four in number, each rated 14,667 kva., 13,200 volts primary, 39,600/68,600 volts Y. These are connected delta on the primary and star on the secondary, with the neutral solidly grounded. It should be noted that there are no circuit breakers between the generators and the transformers. The secondary 68.6-volt leads are then brought up to the high voltage bus structure mounted on the roof of the main buildings, where they pass through electrically operated, three-pole disconnecting switches to the high-voltage bus. At the present time four lines are connected to this bus, two going to Burnaby substation which will receive most of

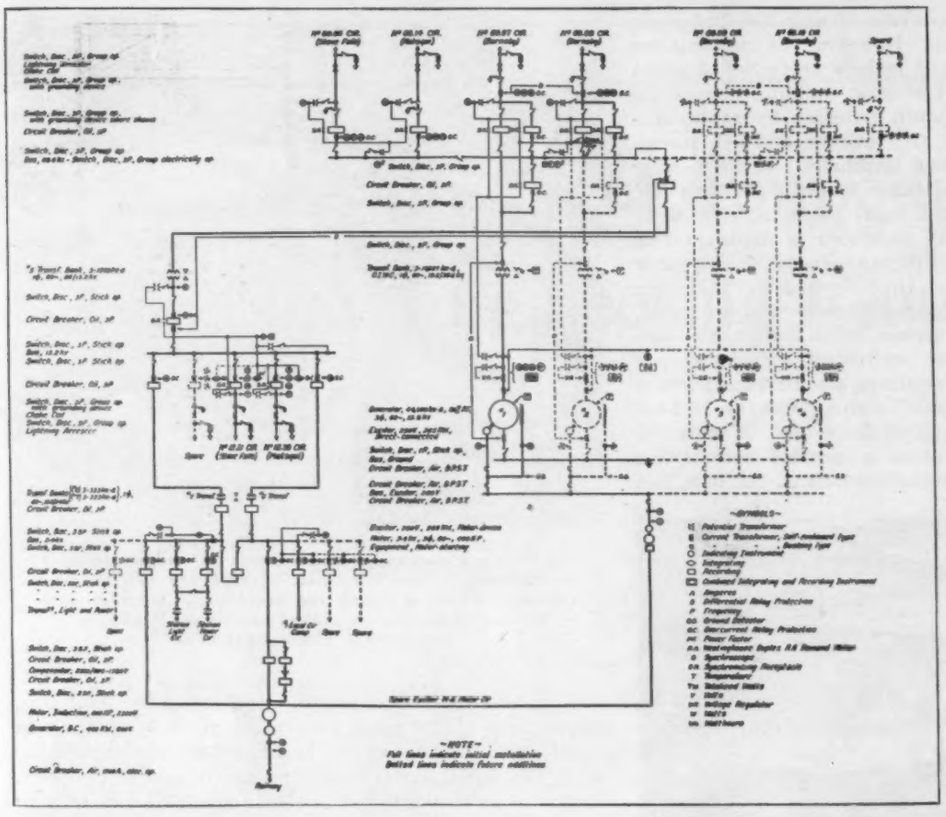


Fig. 5. One-line diagram of the power circuits at Ruskin. The generator leads connected directly into the transformer primary and the tie-in with the Stave Falls plant on both the 68.6-kv. buses are features of this installation. Note the sectionalizing of the 2,300-volt bus and the method of supplying power to the station auxiliary and lighting circuits

the power from this plant, one tie line connecting with Matsqui, and one with Stave Falls. All lines leave the bus through disconnecting switches, oil circuit breakers, and choke coils, and are provided with suitable lightning arresters. Reference to the photographs of the power house show the neat, compact appearance of this installation.

To provide for short-distance transmission and station power and lighting service, a 13.2-kv. bus structure is mounted in the service room of the wing building which receives power through three 1,500-kva., 66-kv. to 13.2-kv., single-phase stepdown transformers energized from the 68.6-kv. bus. The 13.2-kv. bus is also tied in with a 13.2-kv. line to Stave Falls and a similar line to Matsqui. This bus feeds two transformer banks, each of 1,000-kva. capacity and each furnishing power to a separate 2,300-volt bus, provision being made to connect the buses in case of the failure of one bank. One 2,300-volt bus provides station power at 400 volts and 120-volt power for lighting and heating service through separate banks of transformers, and also supplies power to the motor of the spare exciter motor generator set; the other supplies power for local service outside the station. Reference to the accompanying one-line diagram of the power circuits (Fig. No. 5) clearly shows the simplicity and reliability of the electrical layout. Differential protection on the larger pieces of apparatus and relay protection on outgoing lines also contribute to the successful operation of this plant.

The control for this station is concentrated in a room on the top floor of the north wing. Here, from the cable room directly below, the control cables terminate in the various switchboards. Switchboards are of three classes, namely, control, instrument, and relay boards, each board being divided up into groups of panels consistent with the type of circuit it controls. The boards are constructed along the straight-line principle, but are so arranged that the advantage of the circular-type board is realized without its added cost. The dispatcher's desk faces the surrounding panels, and it will be noted that extremely good natural lighting is obtained from the translucent glass ceiling and roof as well as the arrangement of the lighting fixtures shown in Fig. 3. No conduits appear in the room. Floor openings for the vertical boards are directly under and slightly narrower than the base, and for the bench boards are slightly narrower than the width of the board. External wiring passes through slots burned in the bases and to terminal blocks on the bottom of the panel. Floor openings on the vertical boards are covered by removable-bottom metal boxes, in the sides of which the control and instrument wiring conduits are secured. The bench board construction is somewhat similar to this; the removable-side metal boxes are under the front and rear of the channel bases with enough room remaining for easy accessibility to the wiring. An added feature is a platform the same width as the opening, suspended below the floor line at a height that permits ample headroom for anyone making repairs. Reference to Fig. 4 gives an excellent idea of this type of construction.

Throughout, the Ruskin power development reflects a high standard of engineering and architectural design. The departures from the ordinary accepted practice have been more than justified in increased utility, economy and beauty, and will no doubt contribute to the advancement of the standards for plants of this type. This development, costing well over $7,000,000, is only a part of a well organized construction program of the British Columbia Power Corporation to furnish British Columbia with the electrical energy that future expansion of this territory will demand, and its completion, in less than two years from the time of its authorization, is an achievment from the construction as well as the design viewpoint.

2-Mill Commercial Heat by Reversing Refrigeration Cycle

Practical Application of the Reversed Carnot Cycle Makes Available 5 B.t.u. of Commercial Heat for the Expenditure of 1 B.t.u. in Mechanical Work

By **W. R. CHAWNER**
The Southern Sierras Power Company

BRIEFLY reviewing the operation of the Carnot cycle, it will be remembered that this delineates the conditions of an ideal gas during an isothermal and adiabatic expanison during which work is done *by* the gas and an isothermal and adiabatic compression during which work is done *on* the gas to bring it up to the original conditions of pressure, volume, and temperature. This operation, to form a closed cycle, must be performed under ideal conditions and therefore represents the maximum efficiency of heat conversion which can be obtained from an engine and is used as a criterion of steam engine performance.

Many years ago Lord Kelvin pointed out that the Carnot cycle, being made up of reversible processes, might also be used as a basis for the operation of a warming engine. Instead of utilizing the expansion changes to convert the heat energy of a hot body (steam) into work, thus giving up the remaining heat units into the cold body (the condenser), during the isothermal compression, the isothermal expansion of the gas could be arranged to remove heat from a body at a comparatively low temperature and by adding a small amount of energy derived during compression, the sum of these two heat energies could be given up to another body at a relatively higher temperature than the first, thus providing a refrigerating cycle. The practicability of mechanical refrigeration is attested by its present wide popularity, but the possibility of utilizing the heat units rejected to the cooling water of the refrigerating system has not received the attention that the following expansion of the thermodynamic economies would seem to warrant.

Referring to the temperature-entropy chart for the Carnot cycle (Fig. 1), an ordinary steam engine working on this cycle does work expressed as $W = c\ d\ e\ f = \frac{T_1 - T_2}{T_1} \cdot H_1$, and rejected to the condenser is an amount of heat $H_2 = f\ e\ \phi_1\ \phi_2 = \frac{T_2}{T_1} \cdot H_1$, where W equals the work performed by a given quantity of heat H_1 working between the absolute temperatures of say T_1 at the boiler and T_2 at the condenser. Referring to the Carnot cycle as indicated on the entropy temperature diagram we have the following:

	Carnot Cycle	Refrigeration Cycle
$H_2 = f\ e\ \phi_2\ \phi_1 =$	Heat Rejected to Condenser =	Heat Abstracted From Cold Room
$W = c\ d\ e\ f =$	Work Done =	Input to the Compressor
$W_1 = H_2 + W = c\ d\ \phi_2\ \phi_1 =$	Total Heat Input =	Total amount of Heat Delivered to Warm End of Refrigerating Engine

$$H_2 = \frac{T_2}{T_1} \cdot H_1 \qquad (3)$$

$$W = \frac{T_1 - T_2}{T_1} \cdot H_1 \qquad (4)$$

Therefore,

$$H_2 = \frac{T_2}{T_1} \cdot \frac{T_1}{T_1 - T_2} \cdot W$$

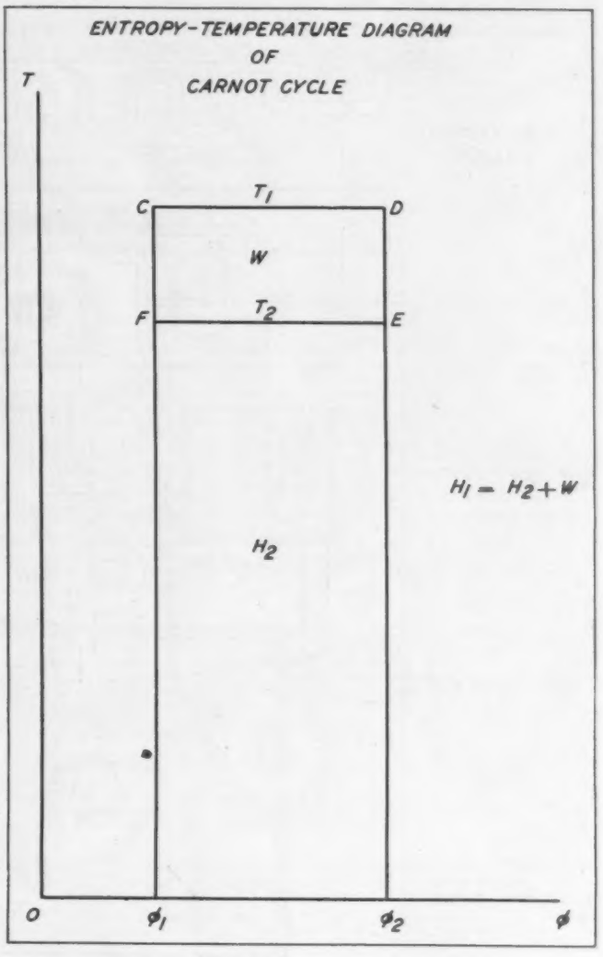


Fig. 1. Temperature-entropy chart

$$\text{or } H_2 = \frac{T_2}{T_1 - T_2} \cdot W \qquad (5)$$

$$\text{and } H_1 = \frac{T_1}{T_1 - T_2} \cdot W \qquad (6)$$

In reversing this process for a refrigerator, if H_2 is the heat abstracted from the cold room by a certain amount of work, W, we have H_2 is equal to $\frac{T_2}{T_1 - T_2} \cdot W$ from (5). The total amount of heat, however, H_1, delivered to the warm end of the refrigerating engine, is equal to $H_2 + W$ or H_1, an amount of heat $H_1 = \frac{T_1}{T_1 - T_2} \cdot W$ from (6) produced by the expenditure of an amount of work equal to W, from which it can at once be seen that if the difference between T_1 and T_2 is only a few degrees, very much more heat can be liberated at the hot end than is put into the compressor work, as is illustrated in a graphical manner on the entropy-temperature diagram.

In other words, the expenditure of a kilowatt-hour on an ammonia refrigerating compressor may very well mean the abstraction of an amount of heat equal to 4 kw.-hr. from a cold storeroom and the liberation of an amount of heat equivalent to 5 kw.-hr. in the cooling water.

Consider a particular case of a cold storage room using ammonia with a condenser pressure of 170 lb. A. and a suction temperature of 0 deg. F. (30 lb. A.). One ton of refrigeration is the removal of 200 B.t.u. per minute.

Theoretical horsepower required per ton of refrigeration under the above conditions is equal to 1.077 hp.

Volumetric efficiency of compressor	80 per cent
Mechanical efficiency of compressor	90 per cent
Mechanical efficiency of motor drive	95 per cent

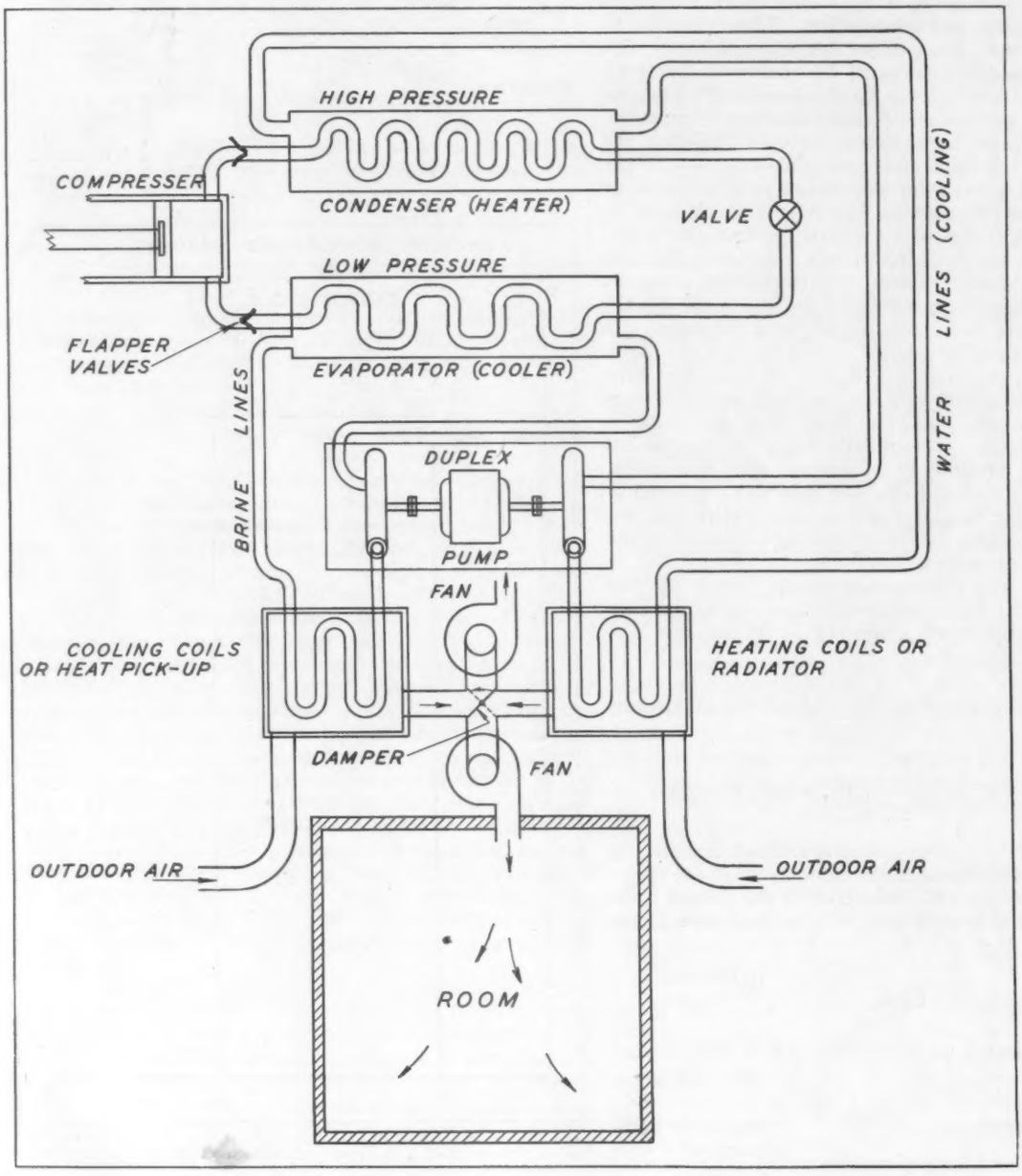


Fig. 2. Practical installation diagram

Usable horsepower of motor 1.58 hp. per ton of refrigeration.

Amount of ammonia to be evaporated per ton of refrigeration = 0.4184 lb.

COOLING WATER REQUIREMENTS

1. Heat removed from refrigerator by ammonia ..... 478 B.t.u. per lb.
2. Heat due to work of compressor..... 109.2 B.t.u. per lb.

Total cooling effect required..... 587.2 B.t.u. per lb.

Figured another way, the heat content of ammonia before and after the condenser amounts to 647.7 – 49.0 = 598.7 B.t.u. per cent of ammonia, or 250 B.t.u. per minute per ton of refrigeration.

Work done in compressor 1.58 hp. = 46 B.t.u. per minute. We have, therefore, by the expenditure of 46 B.t.u. in the compressor, the removal of 200 B.t.u. from the refrigerator and the heat transfer of 246 B.t.u. to the cooling water with an approximate coefficient of performance of 500 per cent. Actually 1 hp. is equal to 42.42 B.t.u. per minute, so in practice we have for one ton of refrigeration 1.58 hp. equals 67 B.t.u. per minute and carried off by the cooling water 250 B.t.u. per minute, or a practical coefficient of performance of around 400 per cent.

From a practical consideration, for domestic use we could have a small refrigerating plant in the basement of a house consisting of an evaporator, compressor, and condenser. In the winter a fan could blow air over the condenser through the ordinary hot air circulating system, and in the summer by operating an ordinary butterfly valve the air could be blown over the evaporator.

For instance, with the standard commercial size refrigerator for 900 watts input to the compressor, the evaporator loses 4,960 B.t.u. per hour, and the condenser receives approximately the sum of the mechanical input and the evaporator losses of

$(0.9 \times 3{,}412) + 4{,}960$ B.t.u. per hour
$= 3{,}070.8$
$4{,}960.0$

8,030.8 B.t.u. per hour

= 2.35 kw.-hr. per hour with an input of 0.09 kw.-hr. per hour, an efficiency of 260 per cent.

This is just a practical application of an existing machine, but, as explained in the theoretical part, if the outside air is at 50 deg. and we require the incoming air at say 80 deg. to give a room temperature of 70 deg., the efficiency of a refrigerator used as a warming engine is increased many times.

A practical method of utilizing the heat thrown off by a refrigerating or air conditioning installation is shown in Fig. 2. This development is the product of several years' research by the Mechanical Heating Company of Los Angeles, Calif. It will be noted that a standard refrigerating unit is adapted for this service by the addition of two water radiators, one of which contains the cold water circulating coils and the other the circulating coils carrying the compressor cooling water. A feature is that the several circulating systems are completely enclosed, the refrigerating medium following the convention cycle in the compressor and expansion chambers and the chilled water and cooling water being pumped around their respective systems by means of a dual pumping unit driven by a fractional horsepower motor. In operation, for cooling the room the external air is drawn over the cold water radiator and pumped into the room, while another fan draws external air over the cooling water coils, and, after absorbing the heat from the cooling water, is discharged back outdoors. For heating, the reverse is true, the air warmed by passing over the cooling water radiator being discharged into the room. External air is again drawn over the coils containing the cold water where a part of its heat is absorbed by the cold medium, the air then being discharged into the atmosphere. The cold water with the absorbed heat is then passed into the refrigerating chamber or refrigerator, where in contact with the ammonia coils it gives up its heat to the refrigerating medium, which in turn, with the heat added from compression, discharges the total heat of the cycle to the cooling water of the compressor. We then return to the beginning of the cycle in which the external air, warmed by the heat drawn from the cooling water, is utilized for room heating.

Up to the present time, only a few experimental systems have been installed for heating small residences or offices. The extremely satisfactory operation of these sets has led to the adoption of this system of heating in a large building now being completed in Los Angeles. This system, which can satisfactorily transfer approximately five heat units for the expenditure of one, making the total available for practical use, and at the same time provide by a mere throw of a valve an ample supply of air for cooling purposes, is novel from the engineering standpoint and practical for building heating, particularly in climates where air conditioning providing for both heating and cooling is desired. On the basis of securing the power input to the compressor on a commercial rate of 1 cent per kilowatt-hour, it is estimated that commercial heat made available by this system thus would cost the consumer approximately 2 mills per kilowatt-hour.

New Books

MODERN LIGHTING, by Frank C. Caldwell, professor of electrical engineering, Ohio State University. Cloth bound; 5½ x 8½ in.; 386 pages; 127 illustrations. First edition. Published 1930 by The Macmillan Company, New York, N. Y. Price, $4.25.—In the author's own words, the function of this book is "to record the present status of the science and art of lighting." Authentic information from many qualified sources is presented in a logically classified manner. The first five chapters are devoted respectively to basic theory and units, requirements for good lighting, light sources, light modification, and the measurement of light and illumination. With this foundation, successive chapters deal with luminaries and lighting systems, design, calculation and maintenance of lighting, industrial lighting, lighting for activities other than industrial, exhibitive lighting, lighting for comfort and convenience, the lighting of residences and schools, and street lighting. Special problems are considered in three chapters: Light projection, radiation and color, and signals, signs and decorations. Three appendices present (*a*) nomenclature and photometric standards, (*b*) code of lighting for factories, etc., and (*c*) code of lighting for school buildings.

MERCURY ARC POWER RECTIFIERS, by Othmar K. Marti and Harold Winograd, respectively chief engineer and rectifier engineer, American Brown Boveri Company, Inc. Cloth bound; 6 x 9 in.; 442 pages; 230 illustrations. First edition. Published 1930 by McGraw-Hill Book Company, Inc., New York. Price $6. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco.—This book explains the operation of the rectifier, derives mathematical relations of the currents and voltages in rectifier circuits, and outlines present-day practice in application of steel-enclosed rectifiers, with emphasis on their employment in railway service. Tables, curves, and oscillograms supplement the theoretical treatment, aiding understanding and making convenient reference. An attempt is made to keep away from involved mathematics, although the book is still somewhat mathematical.

ARTIFICIAL SUNLIGHT, by M. Luckiesh, director, Lighting Research Laboratory, Edison Lamp Works. Cloth bound; 6 x 9 in.; 248 pages, illustrated. First edition. Published 1930 by D. Van Nostrand Company, Inc., New York. Price $3.75. This book is a comprehensive story of the history and importance of sunlight and artificial light for light and vision. A popularly written book of value to those interested in therapy, it explains well the character and use of artificial light and radiation. Entertaining as well as informative.

Checking Reverse Relay Connections

Last of Two Articles on Checking Reverse Power Relay Connections in the Field With Only Standard Metering Equipment Available

By CHARLES F. DALZIEL
San Diego Consolidated Gas & Electric Corporation

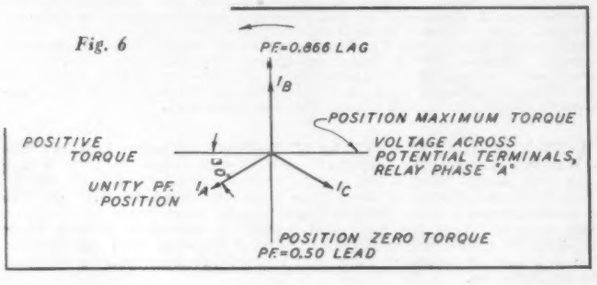
POWER factor determination and reverse relay checking in the field often become problems whose solutions are required with only standard metering equipment available. The preceding issue of ELECTRICAL WEST (March 1, 1931), included an article on practical methods of power factor determination in the field. The previous method of procedure now is expanded to include a simple and reliable method of checking reverse power relay connections.

The directional elements of reverse power or directional over current relays are designed to be connected in one or two ways: (1) The current in the current coil at unity power factor is arranged so as to lead the voltage impressed upon the potential coil by 30 deg.; (2) the current in the current coil at unity power factor is arranged so as to lead the voltage impressed upon the potential coil by 90 deg.

It should be obvious that both methods use a "30-deg. system," as previously discussed, and this must be verified before proceeding to check the relay connections. The most expedient method of an over-all check is to connect a voltmeter and ammeter in the circuit with a wattmeter, and from the readings taken as outlined below, sufficient data also are obtained in order to permit the power factor and "system" present to be computed, using equations given in Fig. 5. (ELECTRICAL WEST, March 1, 1931.)

The method of checking relay connections consists of measuring the torques developed by a wattmeter so placed as to receive the same current and voltage as the various relays. The readings obtained are then compared with those known to be correct at the time of test, and a definite check is thus obtained. In detail, this process is accomplished by connecting the potential element of the wattmeter across the potential terminals of phase "A" relay, and the current element in series with the current circuit of each phase relay in turn. This is continued, using all combinations of relay potential terminals and currents, and the results are recorded in a tabulation similar to that of Table I.

Fig. 6



Wattmeter Readings Obtained Using Voltage From Potential Terminals of Relay

TABLE I

Typical data taken to check General Electric Company's IK-104 reverse power relay—correctly connected. Clockwise phase rotation.

Current Element	Phase A	Phase B	Phase C	Power Factor
A	45*	13	-60	
B	-55	46*	13	67
C	10	-60	50*	Lag.

* Indicates correct connections—see Table No. III second line.

TABLE II

Correct torque relations as measured by a wattmeter for relays using the "thirty-degree connection," with special reference to phase "A" as an example of correct relations.

Power Factor Range	Relation	Torque Measured by a Wattmeter. Voltage Taken Across Potential Terminals of Relay Phase "A." Current Elements—		
		Phase A (Correct current element)	Phase B	Phase C
0-50	Lag	+medium	—maximum	+minimum
50-86.6	Lag	+maximum	—medium	—minimum
86.6-100	Lag	+maximum	—minimum	—medium
100-86.6	Lead	+medium	+minimum	—maximum
86.6-50	Lead	+minimum	+medium	—maximum
50-0	Lead	—minimum	+maximum	—medium

TABLE III

Correct torque relations as measured by a wattmeter for relays using the "quadrature connection," with special reference to phase "A" as an example of correct relations.

Power Factor Range	Relation	Torque Measured by a Wattmeter. Voltage Taken Across Potential Terminals of Relay Phase "A." Current Elements—		
		Phase A (Correct current element)	Phase B	Phase C
0-50	Lag	+maximum	—minimum	—maximum
50-86.6	Lag	+medium	+minimum	—maximum
86.6-100	Lag	+minimum	+medium	—maximum
100-86.6	Lead	—minimum	+maximum	—medium
86.6-50	Lead	—medium	+maximum	—minimum
50-0	Lead	—maximum	+medium	+minimum

TABLE IV

Correct torque relations as measured by a wattmeter for relays using the "sixty-degree connection," with reference to phase "A" as an example of correct relations.

Power Factor Range	Relation	Torque Measured by a Wattmeter Voltage Taken Across Potential Terminals of Relay Phase "A" Current Elements—		
		Phase A (Correct current element)	Phase B	Phase C
0-50	Lag	+maximum	—medium	—minimum
50-86.6	Lag	+maximum	—minimum	—medium
86.6-100	Lag	+medium	+minimum	—maximum
100-86.6	Lead	+minimum	+medium	—maximum
86.6-50	Lead	—minimum	+maximum	—medium
50-0	Lead	—medium	+maximum	—minimum

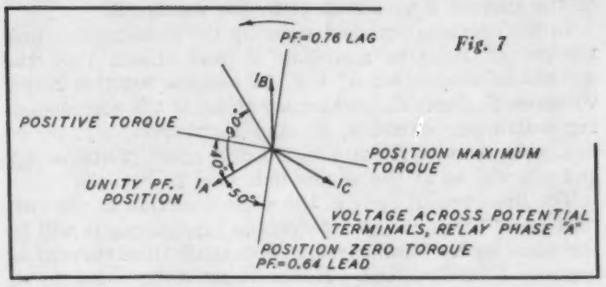


Fig. 7

In Fig. 6 are shown the vector relations existing in the directional elements of the Westinghouse CR and CZ relays, and also the General Electric IB relay (group 1 above). Table II gives the corresponding torque measured by a wattmeter using the potential across the terminals of the phase "A" relay, and all currents, for the complete power factor range. Fig. 7 shows the vector relations existing in the directional elements of the General Electric IK relays and, when specially ordered, IB relays (group 2 above). Table III shows the corresponding torques measured by a wattmeter using the potential across the terminals of the phase "A" relay, and all currents for the complete power factor range. After the wattmeter readings have been entered in a chart similar to that shown in Table I, the correctness of wiring is checked by noting if the torque deflections correspond to those known to be correct for the power factor existing at the time of the test, as shown by either Table II or Table III.

In cases where the power factor is close to the limiting values, check readings should be taken when it is known that the power factor has changed, and a comparison of the combined results will verify both the actual power factor and the connection check.

In some cases relays originally designed to be used with the "thirty-degree connection" are connected so that the current in the current coil at unity power factor leads the voltage impressed upon the potential coil by 60 deg., in order to effect economies in installation. The procedure parallels that outlined above, and the correct torque relations are given in Table IV.

It should be noted that counter-clockwise phase rotation has been assumed throughout this discussion. If the phase rotation is reversed, the equations and tables can be made to apply by merely interchanging the data for Phases B and C, and the results obtained will be correct. However, in either case, the final results will be the same regardless of the phase rotation; for instance, the columns in the tables that show the torque relations for the correctly connected relays remain unchanged, and the relay connection check can be made by this method regardless of the actual rotation.

TABLE V

Typical data taken to check General Electric IK-104 Reverse Power Relay—correctly connected.

Current Element	Wattmeter Reading Voltage Applied			Power Factor
	A	B	C	
A	+ 45*	+ 13	— 60	67 Lag.
B	+ 55	+ 46*	+ 13	
C	+ 10	— 60	+ 50*	

* Plus medium reading indicates that connections are correct. See Table III.

If the connections are correct, the directional contacts should be examined in order to determine if the polarity is correct, that is, if the contacts act to trip with power flowing in the desired direction.

In reality this apparently cumbersome method of checking reverse power relay connections independently of switchboard wiring identification develops into simple routine in the field, and should prove to be both a rapid and a positive method.

▼ ▼ ▼

Reactive Kva. Metering---VII

Effect of Unbalanced Load Upon the Accuracy of Registration of Three-Phase Three-Wire Reactive Meters

By E. C. GOODALE
Tacoma, Washington

IN PREVIOUS articles of this series, concerning three-phase, three-wire reactive metering, it was stated that the various schemes of connection all give true registration regardless of power factor, provided that line voltage and currents remain balanced.

If the line voltages are unbalanced, none of the schemes of connection (auto-transformer, reactor, cross-phase) will give correct metering, and the greater the voltage unbalance the greater will be the error.

The reason for this is that true reactive metering differs from the metering of power only in that the voltages chosen to energize the reactive meter's potential elements must lag those applied to the corresponding wattmeter elements by 90 deg. Consequently the auto-transformer-type meter will not have the proper voltages applied to its potential elements if the line voltages are unbalanced. For, as may be seen by referring to the article on the auto-transformer-type meter*, the voltages for the reactive meter are derived from the vector sums or difference of certain fractional parts (57.7 per cent and 115.5 per cent) of the voltages applied to the auto-transformer. Therefore, if they are not exactly 60 deg. (or 120 deg.) apart and numerically equal, the resulting reactive meter voltages will not be lagging them by 90 deg., nor will they be numerically equal to each other and to the wattmeter voltages.

Unbalanced voltages have the same effect, but are arrived at in a different way, when the reactor-type reactive meter is the one used. The effect of voltage unbalance on the cross-phased meter is to produce inaccuracy because of the fact that this meter depends for its accuracy upon the 60-deg. or 120-deg. relationship between the line voltages, and consequently between the reactive meter voltages (since the line voltages or definite fractions of them, by using potential transformers, are simply interchanged in feeding the cross-phased reactive meter).

* See ELECTRICAL WEST, Dec. 1, 1930, p. 286.

If the line voltages, however, remain balanced, but the loads are unbalanced, then the auto-transformer and reactor methods will give correct registration, but the cross-phased connection will register incorrectly. Accompanying illustrations explain these conditions graphically.

For simplicity, assume that a three-phase balanced source is available at the load, but that the load is connected to a single phase only. This will represent a bad case of unbalance. The best metering should register this load correctly, even though it be a three-phase meter and the load only single phase. Assume that the load is connected across the outer two conductors.

By the use of Kerchoff's law it is known that the voltage available at the load (see Fig. 21) considered from the lower conductor to the upper, which consequently is assumed to be the higher potential, will be equal to $-E_B + E_A$ (for arrow E_B opposes us and arrow E_A is with us). Fig. 22 shows that this vector difference will be $E = 10{,}000$ volts, closing the polygon as shown.

Now assume that the load is of such value that it draws a current of 300 amp. lagging its voltage E by an angle of 30 deg., as shown in Fig. 22. The reactive component of this current with respect to its voltage is the length of the perpendicular from its vector tip to the line of the voltage. (This holds true provided both current and voltage vectors have a common heel. If they intersect, the reactive component is the sum of the perpendiculars from the extremities of the current vector to the line of the voltage vector. If they neither touch nor intersect it is the difference of the perpendiculars from the extremities of the current vector to the line of the voltage. The direction of this reactive component always is toward the toe of the current vector, as in Fig. 22.) In this particular case the value of this reactive component is 150 amp. Hence the reactive volt-amperes taken by the load are $10{,}000 \times 150 = 1{,}500{,}000 = 1{,}500$ Rkva. The true power in this case is $10{,}000 \times 259.8 = 2{,}598{,}000$ watts $= 2{,}598$ kw., where 259.8 is the power component of the current I with respect to the voltage E.

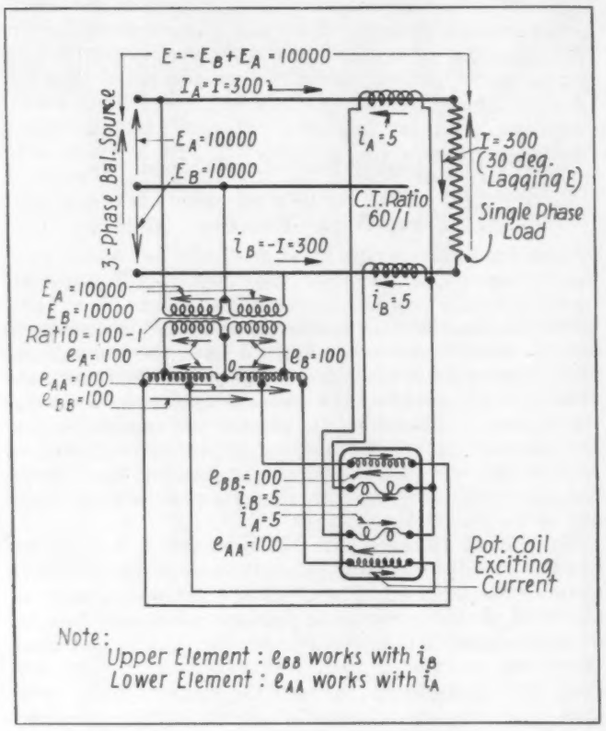
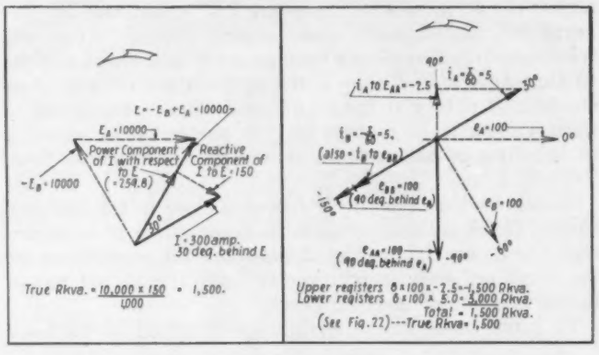


Fig. 21. Connection diagram of a three-phase three-wire reactive meter on a three-phase circuit serving a single-phase load

In the previous article discussing the auto-transformer method of reactive metering it was shown that the method of connection of Fig. 21 secures reactive meter voltages, E_{AA} and E_{BB}, which lag those of the corresponding wattmeter elements, E_A and E_B respectively, by 90 deg. Hence with E_A and E_B 60 deg. apart, voltages e_{AA} and e_{BB} will be at the angles indicated in Fig. 23.

The line current I_A is in the same direction as the current I and there are no intervening taps, hence it will be the same as I. Similarly, but oppositely, line current I_B opposes I in direction. Hence it must be equal to $-I$ and will take the position shown in Fig. 23. The voltage transformer ratio is assumed to be 100/1 and the current transformer ratio 60/1. This gives a transformation ratio of 6,000/1, or a constant of 6 if it be desired to work from the secondary side with current and voltage values and determine the reactive kva. instead of reactive volt-amperes.

Referring to Fig. 23, it is apparent that in the lower element the secondary current i_A works with voltage e_{AA} at an angle of 120 deg. Hence the registration is backward in the amount of 1,500 Rkva. Current i_B, however, works with voltage e_{BB} directly in phase, hence giving a


E = -E_B + E_A = 10000
E_A = 10000
-E_B = 10000
Power Component of I with respect to E (= 259.8)
Reactive Component of I to E = 150
30°
I = 300 amp. 30 deg. behind E
True Rkva. = 10,000 × 150 / 1,000 = 1,500.
40°
i_A to E_AA = -2.5
i_A = 5/60 = .5
30°
i_B = 5/60 = .5
(also = i_B to e_BB)
e_A = 100
0°
e_BB = 100
(90 deg. behind e_A)
-150°
e_B = 100
e_AA = 100
(90 deg. behind e_A)
-90°
-60°
Upper registers 6 × 100 × .25 = 1,500 Rkva.
Lower registers 6 × 100 × .5 = 3,000 Rkva.
Total = 1,500 Rkva.
(See Fig. 22)---True Rkva = 1,500

Left: Fig. 22. Vectorial determination of phase relations of voltage E and current I of Fig. 21. Right: Vectorial diagram proving correct registry of auto-transformer type of reactive meter under the unbalanced load of Fig. 21

registration of 3,000 Rkva. The net registration, therefore, is $3{,}000 - 1{,}500 = 1{,}500$ Rkva., which is exactly equal to the true Rkva. drawn by the load.

It is apparent, then, that this type of meter registers correctly regardless of load, provided the line voltages are balanced, that is, equal numerically and 60 deg. (or 120 deg.) apart, depending upon which direction is assumed.

The reactor-type reactive meter gives the same registration as the foregoing under all conditions, the lower rating of the voltage coils taking care of the lower voltages impressed upon them.

Cross-phase connections for metering the same load and the graphical determination of the meter registration are shown in Fig. 24. In the upper element current i_B works with $-e_A$ at an angle of 30 deg., giving a registration of 2,598 Rkva., while in the lower element current i_A works with voltage e_B at an angle of 90 deg., hence giving no registration at all. In this particular case, therefore, the upper element registers the total Rkva. This figure of 2,598 must, of course, be multiplied by 0.866 to place it on the same basis as other metering connections. Thus $2{,}598 \times 0.866$ gives a metered value of 2,250 Rkva. as against the true value of 1,500. In this particular case the cross-phased reactive meter over-registered by 750 Rkva., or by 50 per cent.

Therefore it becomes apparent that this type of connection is suitable only for cases of balanced loads and balanced voltages, if true accuracy is desired. Also it

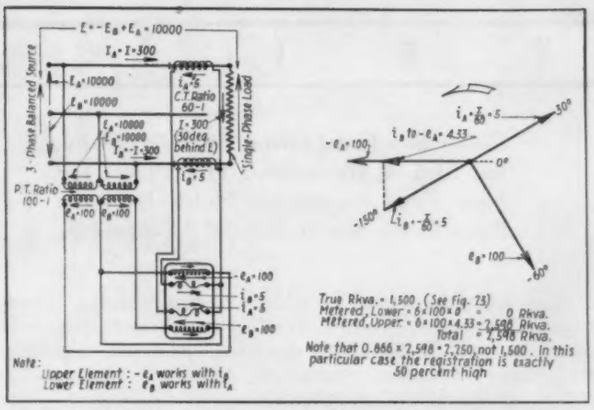

3 - Phase Balanced Source
Single-Phase Load
C.T. Ratio 60-1
P.T. Ratio 100-1
Note:
Upper Element : - e_A works with i_B
Lower Element : e_B works with i_A
True Rkva. = 1,500 (See Fig. 23)
Metered, Lower = 6×100×0 = 0 Rkva.
Metered, Upper = 6×100×4.33 = 2,598 Rkva.
Total = 2,598 Rkva.
Note that 0.866 × 2,598 = 2,250, not 1,500. In this particular case, the registration is exactly 50 percent high

Fig. 24. Connection diagram of three-phase three-wire cross-phased reactive meter serving the unbalanced load of Fig. 21, and its related vector diagram

seems evident that in any case in which the customer's billing is influenced by the readings of a reactive meter it is essential that that customer have well-balanced voltages, regardless of which type of reactive meter is used. The auto-transformer type, however, would be the most satisfactory.

EDITOR'S NOTE: Four-wire, three-phase, three-element reactive meters for three-phase, four-wire circuits will be covered in the eighth article of this series, which will appear in an early issue of ELECTRICAL WEST.

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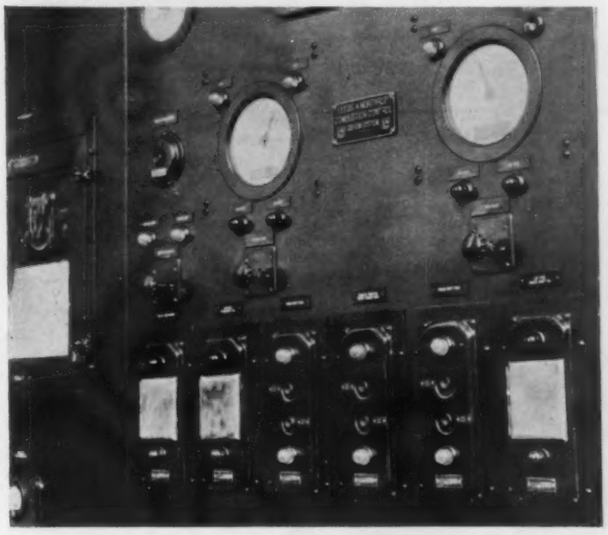
Safety Door for Push Button Switches

AS A SAFEGUARD against pushing the wrong button on a boiler control board while watching the instruments, the operators at the Shuffleton steam plant of the Puget Sound Power & Light Company, Seattle, have devised a safety door which covers the push buttons as shown in the accompanying illustration. The little door is formed out of a piece of sheet metal and is mounted directly on the escutcheon plate by means of a small



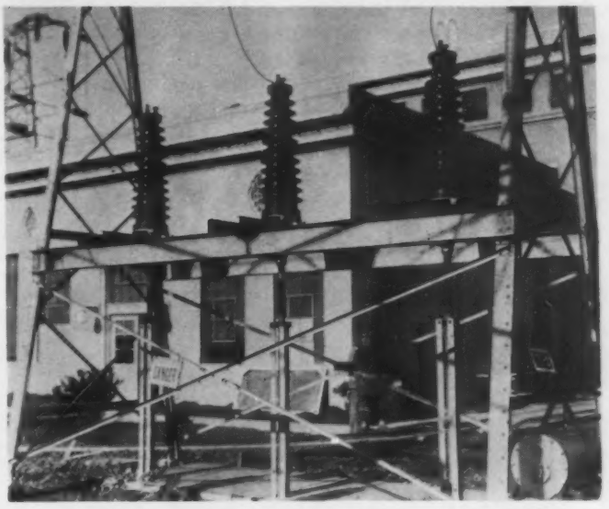
spring hinge. It has proved most effective and is inexpensive to install.

The accompanying photograph was taken before the doors in question had been painted black to match the finish of the rest of the panel.

Coast Gets Its First 60-Kv. Underground Cable

CONFRONTED with the necessity of passing over the building containing the switchboard and synchronous condensers or passing around the end of the substation structures which would have required going under twelve circuits of higher than 60 kv., should the regular overhead run be made, engineers of the Pacific Gas and Electric Company at the Newark, Calif., outdoor substation met the problem by installing an underground cable in fiber ducts connecting the station transformers with the 60-kv. transmission line. The cable, which went into service in January, 1931, is the first of such high voltage to be used on the Pacific Coast.

The cable used is single-conductor, 500,000-circ.mil stranded copper, insulated with 48/64-in. saturated wood pulp paper, metallized paper shields, 9/64-in. commercially pure lead sheath of type H construction, rated by



Terminal of first Pacific Coast 60-kv. cable installation

the manufacturer, the General Cable Corporation, at 69 kv. Six 110-kv. rating oil-filled barrier-type terminals were used, three at each end of the approximately 300-ft. underground run, to terminate the single-conductor cables and to connect them with the overhead line. The terminals were also of General Cable make.

It is of special interest to note that this underground cable is used on a continuation of the Electra-Newark 60-kv. line, which was one of the first 60-kv. overhead circuits to be established (some 30 years ago) on the Pacific Coast.

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IN ORDER TO ANSWER a great many inquiries, the German Electritechnical Society announces that the following society specifications are appearing in English, French, Portuguese, and Spanish, as well as in German, and may be had from Abt. Verlag, Berlin W 57, 68 Potsdam St.

Corresponding to VDE 452, Rules for evaluating and testing electrical machines R. E. M. (1930).

Corresponding to VDE 453 Rules for evaluating and testing transformers R. E. T. (1930).

Corresponding to VDE 450 Directions for insulated circuits in high tension work. V. I. L. (1930).

Corresponding to VDE 449 Directions for enclosed circuits.

Corresponding to VDE 403 Directions for lead cables in high tension work. V. S. K. (1928).

Now It's Modernize

Either as a Local Group or Individually, the Idea of Revamping Old Plants for New Type Production Holds Business Potentiality for Industrial Contractors

OUT OF the many things which the present, and it is to be hoped past, period of business anemia (let the word depression be scrapped) has brought about, besides headaches and dark brown tastes, has come one useful development. That is the scurrying and scheming being done today to work out new methods, to devise shortcuts, to make two safety razor blades grow where only one sprang from the presses before.

While this so far has not reflected itself in more work for the industrial electrical contractor, it has ploughed the field and furrowed it, so that it is now ready for the seed of something definite to be planted. When that definite revision of process or change of method is actually planted, the work of the contractor will begin. But why wait that long?

Right now the industrial electrical contractor who does not keep himself and his organization awake to all the newest twists of the business is apt to find that his services are one of the things to be eliminated. He should be alert to see that he is not fixed to one of the corners that are cut off.

Since this period has every earmark of an emergency, the successful industrial electrical contractor will apply first aid to injured industry; he will do the things to do till the doctor comes. He will offer ideas and suggestions to plants for improved operation. He will tell plant managers and superintendents of the newest devices available for automatic control, regulated operation, of the requirements in the art of applying electricity not alone in running motors but to time certain operations, count, record or diagram what takes place so that improved methods may be evolved.

But first he must learn what these are.

It is here that the subject becomes personal. The places to go to learn of new developments are: Trade magazines, technical magazines, manufacturers' catalogs and advance literature, new technical books, the industrial specialists of the manufacturers who are developing such products, the research men of the radio and telephone companies.

Contractors who have neglected their reading are surprised to learn, during conversation with editors of such publications or representatives of manufacturers, the extent of the possibilities that lie in the radio or electron tube. For example, it has not occurred to many yet that there are workable, practical uses for photo-electric cells in anything but the movies.

Yet in Los Angeles last month a new theater switchboard was installed in which grid glow tubes control all the dimming of the house and stage lighting. In several large industrial plants photo-electric cells are used to count or grade products as they pass by on conveyors.

The magazine, *Electronics*, among industrial fields to which the electronic tube technique applies, lists on its cover: Carrier current telephone systems, facsimile detection and production, amplifiers, measurements, therapeutics, counting, grading, traffic control, metering, machine control, recording, analysis, aviation lighting, metallurgy, beacons, compasses, automatic processing, crime detection, and geophysics.

How to make use of this knowledge is almost too obvious to describe. One electrical contractor salesman in Los Angeles (Lee Baltzelle, of Norton & Norton) rigged up a portable photo-electric cell kit and took it around to his various business prospects. "Let me show you something new," he told them, and continued in this line: "I don't know whether there is anything you can use this for or not, but you will be interested in it anyway. It's uncanny, the way it responds to light. Maybe it will suggest something to you that I cannot appreciate, some use or special application that will be useful and economical to you."

In the first place it established his aliveness. Secondly, it stimulated the prospect's imagination as to possible uses for his own plant improvement. Thirdly, it planted the idea that here was a man who was modern, who knew his business, and who would be the logical man to have assist in remodeling and modernizing his plant.

Another firm in Oakland put on a "1931 Electrical Tool and Equipment Show" in its showroom and shop, attracted leading industrial executives from all over the region, demonstrated new tools, welding apparatus, photo-electric cells, lighting equipment, high frequency tools and generators, new types of switches, controls, devices, and accessories.

Asked about the idea of a modernization movement in northern California, Frank Boyd, president of the Pacific Electric Motor Company, which staged this show, replied laconically, "We're practicing it. We modernized our own shop first to find out what it would do. It's easier to sell to others when you know what it will do from experience."

Last year Louis Kalisher, a Brooklyn electrical contractor and motor specialist, set all of electrical New York City busy on a modernization program that netted surprising returns to everyone who participated. For that job of organization he was awarded the McGraw award to electrical men for the greatest contribution of the year to the electrical contracting industry. The organization plan, the procedure, the report of results are all available. Any community in the West that can be swung into an organization to promote such a business building movement may obtain complete details either from this magazine or the Association of Electragists, International. All that is required is some of that individual initiative which the industry fights and bleeds for, but which is all too rare.

Lest it be said that Western industrial plants are too new to offer many possibilities, it is well to stop short and realize that none of them built up to a year ago knew anything about electronic tubes, intricate interlocking control equipment, sensitive speed regulation by means of modern design motors and control, or anything else that has sprung into being almost over night.

In these fast moving days one is never too *young* to learn.

Steps to Airport Lighting

How Special Equipment at Fresno Airport Was Installed

After conduit had been run to each field marker location, a hole was dug and the Crouse-Hinds special unit set on top of a piece of drain tile

Fresno Municipal Airport's unique electrical set-up was engineered by George Bowman, city electrical engineer, and installed by the Electrical Construction Company of Fresno

Next, sand was packed under the unit and fuse disconnect pull box for drainage and a ring form set in place

Concrete was then poured to make the entire ring flush with the later oil-paved surface of the field. At night these mark the center of the landing area in the prevailing wind direction

Below: One of three batteries of floodlights

Below: Describing the installation method

Below: Removable metal forms were then placed after the round cement base was cast

Base completed and light mounted, disconnect switches were then mounted in one can, transformer in the other

Above: Conduits to feed floodlights or field markers were run underground to required location and stubbed up to two cans, surmounted by a heavy pipe

Extreme right: Finished marker light showing fuse disconnect can in base, opened

Simple Power Factor Measurement

By OTTO WIEMER
Electrical Engineer, Los Angeles

IN A PREVIOUS article on power factor measurement, mention was made of the fact that the choice of methods is often limited by the instruments that are available for testing purposes. Wattmeters in particular, which are necessary for all of the methods described so far, not always are obtainable readily. The same may be true of voltmeters. However, if the only instrument available is an a.c. ammeter of suitable range, it is still possible and often very convenient to make a power factor test. This can be done by an adaptation of one of the oldest methods of power measurement, the three-ammeter method.

This method does not necessarily require the use of three separate ammeters as the name would seem to imply. Equally satisfactory results can usually be obtained with only one ammeter if a few simple precautions are taken. A non-inductive resistance load is essential for this method, in addition to the inductive load whose power factor is to be determined. If there are no lighting or heater circuits on the system, a bank of lamps or heating elements can easily be improvised to act as an auxiliary load. If the line voltage fluctuates during the test, a voltmeter is useful to avoid errors caused by current variations, although the voltmeter readings do not enter into the power factor calculations.

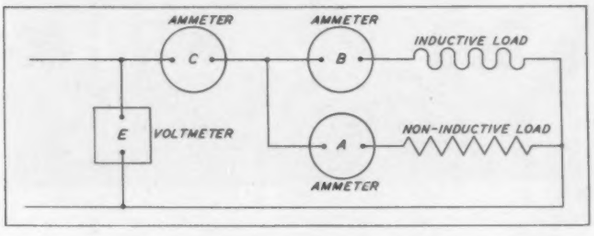

Fig. 1. Connection diagram

The three ammeter readings required by the test are (A) for the non-inductive load, the power factor of which is known to be unity, (B) for the inductive load whose power factor is to be determined, and (C) for the combined load of the other two, the power factor of which can also be determined from the same three readings if desired.

Fig. 1. shows the arrangement of the circuits and loads with the ammeter connections indicated by letters corresponding to the current readings. If the ammeters require current transformers, the connections shown would apply to the current transformers. If only one ammeter is used, consecutive readings can be taken with three different connections, and it would then be advisable to use the voltmeter (E) in order to take all of the current readings at the same voltage. Both loads should be connected during all readings in order to avoid the effect of changes in line drop. The same connections and readings would apply to one phase of a balanced three-phase system as for the single-phase system shown.

Fig. 2 shows the graphical method of determining the power factors of both the inductive load and the combined load from the three ammeter readings. The construction of the diagram is as follows:

First, choose a convenient scale, preferably one with tenth divisions, to represent amperes per unit of length. Ordinary quadrille paper is convenient for this purpose. Lay off the non-inductive load current (A) on a horizontal line to the scale chosen. From one end of this line draw an arc with a radius equal to the inductive current (B), and from the other end draw an arc with a radius equal to the combined current (C), using the same scale. Draw a perpendicular line from the intersection of the two arcs to the horizontal line (A) extended.

Then the distance (R) represents to scale energy component of the current (B) and the ratio, (R) divided by (B), is the power factor of the inductive load. Likewise, the ratio, (A) plus (R) divided by (C), is the power factor of the combined load. The remaining part of the figure is drawn to show the complete vector diagram in its usual form, θ and ϕ representing the angles of lag and (X) the reactive component of (B) and (C). The angles can be measured with a protractor and (X) can be determined from the scale if this information is needed for other purposes.

The formulas for calculating power factors are based on a well known trigonometrical solution of an obtuse triangle when two sides and the included angle are given. With a slide rule the formulas are quite simple to apply and are more accurate since they are not subject to errors of construction and measurement. Neglecting such errors, the power factors determined by the two methods should be exactly the same.

For an example of the use of the three-ammeter method, let us assume that it is desired to determine the power factor of a neon sign that has been added to a lighting load. Ammeter readings show that the neon sign circuit (B) takes 10 amp. and one of the lighting circuits (A) takes 6 amp., while both circuits combined (C) take 13.1 amp. By applying the graphical method it will be found that the energy component (R) is 3 amp. The ratio, 3 divided by 10, is 0.30, or 30 per cent, which is the power factor of the neon sign load. Adding the energy component, 3 amp., to the lighting load, 6 amp.,

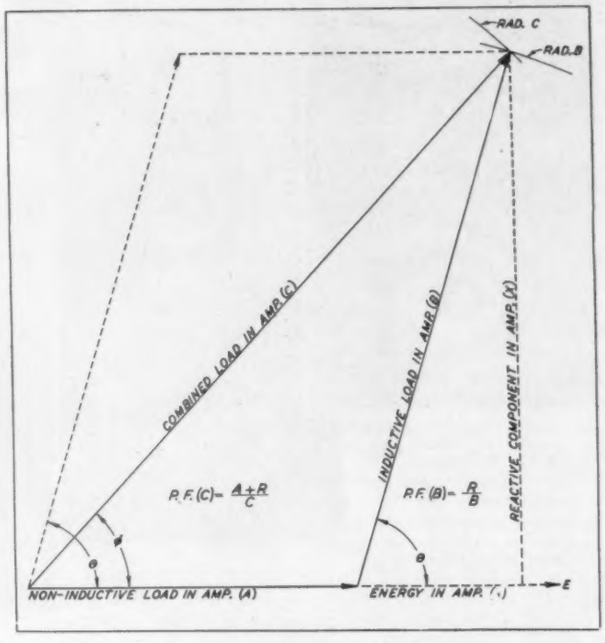

Fig. 2. Graphical method of determination

will give an energy component of 9 amp. for the combined load. The ratio, 9 divided by 13.1, is 0.687, or 68.7 per cent, which is the power factor of the combined load. By applying the formulas it will be found that the same power factors will be obtained.

The formula for the algebraic determination after values have been obtained for each of the symbols, is:

$$\text{Cos } \phi = \frac{(C^2 + A^2) - B^2}{2AC} = \text{P.F. of combined load} \quad (C)$$

$$\text{Cos } \phi = \frac{C^2 - (A^2 + B^2)}{2AB} = \text{P.F. of inductive load} \quad (B)$$

The importance of taking the power factor into account is illustrated by this example. The arithmetical sum of the two load currents would be 16 amp. which, if assumed to be the actual load, as is often done, would overload a No. 14 wire circuit. Actually, the two loads are combined on one circuit of No. 14 wire without exceeding its safe current capacity. This might be an important consideration in cases where a spare circuit is needed.

Similar tests could be made on large three-phase power installations with a balanced motor and heating load. With the increasing use of large furnaces and heating ovens, such installations are becoming more common. The convenience of making power factor tests with ammeters only should not be overlooked.

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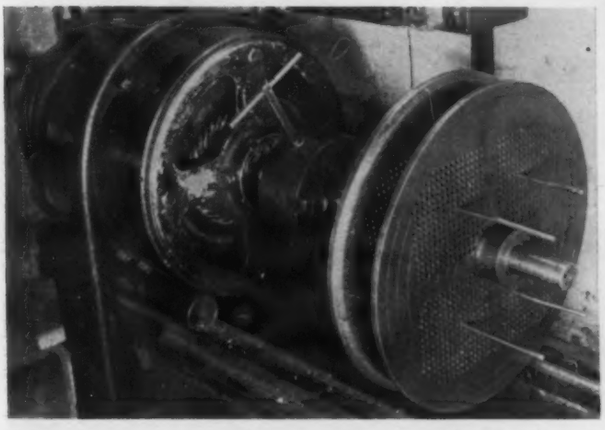
Winds Coils of Any Size or Shape



THIS home-made field coil- and spool-winding plate, designed and built by the Buzzell Electric Works, San Francisco, cost about $200 in labor alone. Yet, by reason of its wide adaptability, it has proved a good time- and money-saver. As may be noted, holes were drilled on both sides of the double plate in all positions possible, allowing the four pins to be placed in any position needed for the winding of a coil or spool. Wire is fed from spools on a home-made rack governed by a brake.

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PRACTICAL INFORMATION on the manufacture, test, performance, and application of a.c. and d.c. motors and generators, frequency converters, and motor-generator sets of small and large capacities is contained in a new book on motor and generator standards just published by the National Electrical Manufacturers Association.

For a Light Meal

FOR A PERIOD of 30 years the design of railroad coaches and diners had remained at a snug standstill, and then "came the dawn."

Consideration of exposed luminaires was eliminated by the straight sweep of line in the new interiors. The maximum light was wanted directly within the confines of the table in order to enhance the effect of coziness and attractiveness. Spill light at wide angles had to be eliminated for reasons of glare, the more so as the low mounting heights would place light sources in the line of vision. Brackets were ruled out for this reason as well as because of safety. Structural limitations in the car deck as well as definite wattage capacity prevented the use of large lamps. The problem then was one of providing more light without using more wattage; of accurately controlling it to each individual table; of preventing glare; and of making the equipment itself inconspicuous and in harmony with the architecture.

Interior of new Southern Pacific diner

The Grattan English Company, San Francisco, was commissioned to design the interiors of the first 25 new diners for the Southern Pacific Company.

After a series of experiments by Mr. English and the Holophane Company, a successful solution of the lighting problem was obtained. An individual lighting unit was recessed in the car deck directly over each of the twelve tables. This unit consisted of a metal housing containing a spherical reflector and 50-watt inside-frosted lamp accurately positioned over a flat 8½-in. square prismatic control lens, which came flush with the deck. The method of supporting the lens permitted access for lamp re-renewals, yet maintained rigid mounting.

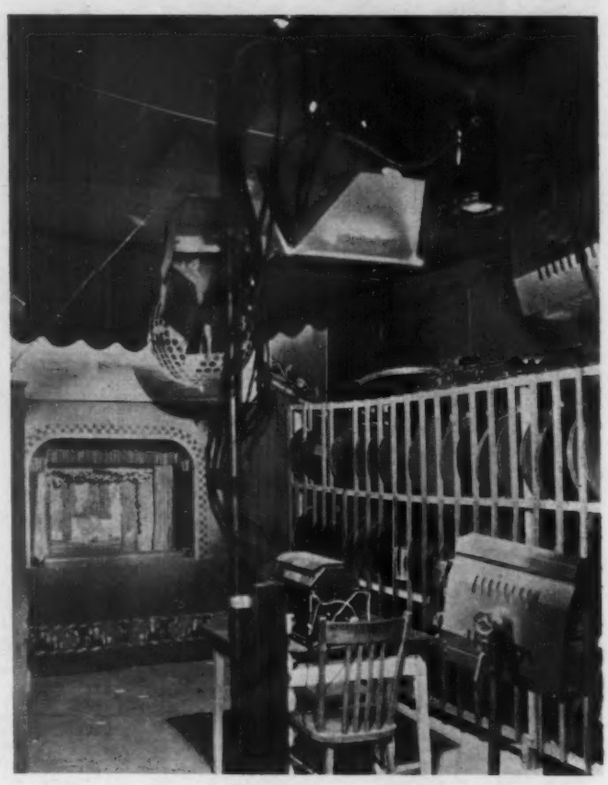
Focus of the lamp was such that the light was confined exactly within the edges of the table. To compensate for the fact that the unit was mounted fairly close to the window end of the table, the lamp was off-set from the lens center so as to direct light to the opposite end. This resulted in an asymmetric, elliptical-shaped beam of the exact spread and intensity required. Confining the maximum candlepower in this manner eliminated possibility of discomforting brightness in the unit itself from any direction that the eye would normally view it. The person dining is not conscious of any lighting equipment whatever, yet the light effect is ideally accomplished.

Specializing in The Spectacular

This Electrical Concern Has Contractors and Dealers as Customers, Not Competitors

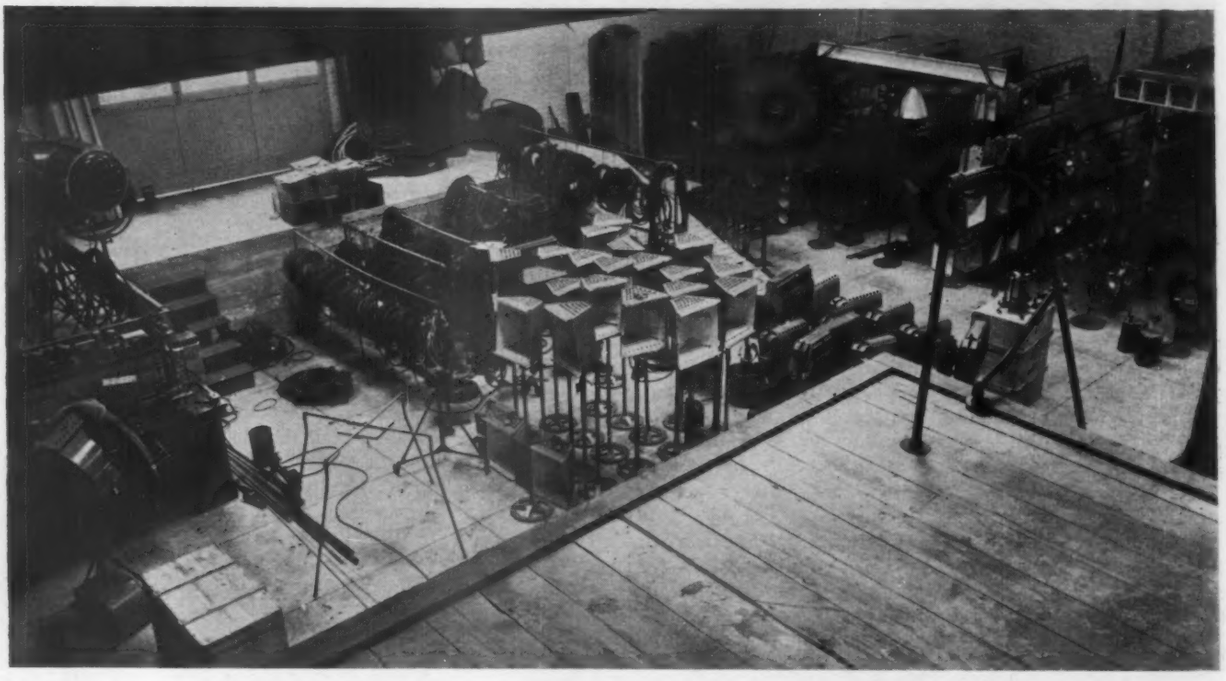
DEVOTING its entire effort to the specialized field of stage equipping and decorative and spectacular lighting, the Pineau & Howse Electric Company is probably the only electrical concern in the West that merchandises none but theater appliances and competes with no electrical contractors in the field of new wiring or in the installation of the equipment which the firm sells. In its three years of business in Los Angeles, the organization has enjoyed unusual success, recently moving into a new and larger building of its own after further additions to the old site became impossible.

Its business of manufacturing and selling footlights, borderlights, special floodlights, and supplying electrical equipment on a rental and sales basis amounts to $120,000 per year, requiring the employment of eleven persons. Fully 90 per cent of this business is to schools, theaters, and to amusement enterprises of every nature.

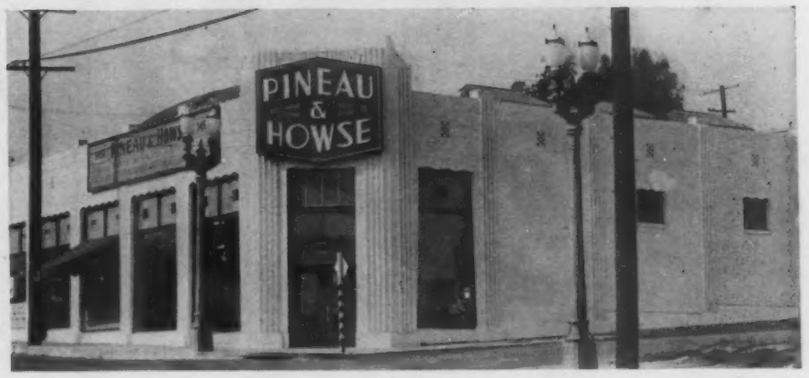


Miniature theater for the testing of lighting effects. Racks on the side contain color wheels for spotlights

Not only does the firm cater to trade in the Los Angeles district and the neighboring state of Arizona, but orders have been filled for Honolulu, Philippine Islands, and as far east as Japan and Siam.



Storeroom in the back. The method of hanging apparatus and wire on iron racks by means of hooks is interesting. This promotes ease of handling and of inspection as well as telling at a glance whether the stock of a particular piece is low. The ramp in front of the door is also a storage space for heavy searchlights such as that shown, eliminating necessity of lifting these



Facade of the Pineau & Howse building in Los Angeles. Covering 8,750 sq.ft., the new store was made necessary by the growth of the firm's business in its three years of existence

Because of its location in an outlying business section, and advertising that it does, the company gets many requests for small repair and alteration work. This business is sufficient to keep one man on this specialty alone, but whenever another contractor is interested in the work, Pineau & Howse withdraw, feeling that they are not in competition with those who in all other respects are their customers.

Glass department where all lamps and diffusing glassware are stored. The rack wherein lamps are fixed is another novel feature

The new building contains some 8,750 sq.ft. of floor space, of which 7,000 is devoted to stockroom, shop, and storage room, and 1,400 to offices and sales floor. The rear of the site contains a cement yard space of approximately 1,200 sq.ft. and a ramp built exactly truck height to eliminate the necessity of lifting large searchlights, dimmer banks, and heavy equipment of that nature.

Incorporated in the building is a miniature theater upon which may be demonstrated various phases of lighting and by means of which experiments in new effects may be conducted. A private office, furnished in the manner of the director's room of a bank, is lighted with picked samples of Pineau & Howse cove lighting such as is installed in many theaters in the territory.

"No secrets account for our success," both owners, Gene Pineau and Dave Howse, confess," but definite practices contribute to the enrichment of each department. For instance, in the rental department, whenever a piece of equipment is returned it is inspected for scratches and wear. A scratch is immediately painted; worn parts are replaced or reinforced. In this way our equipment always appears new and users take more care of it with consequent smaller depreciation because of abuse."

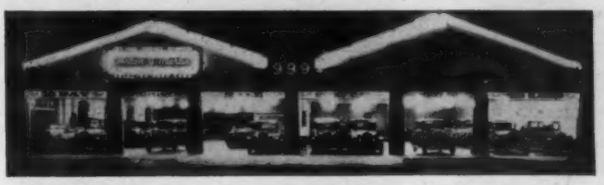
▼ ▼ ▼

Electricity Lights Better Than Sun

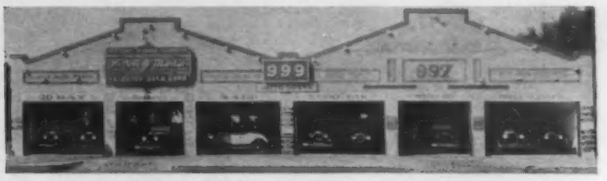
GOOD lighting sells motor cars. Substantiation of this maxim comes from Anton J. Martin, Los Angeles used car dealer, who, upon advice of R. A. Crosby, illuminating engineer of the Los Angeles Gas and Electric Corporation, installed 38 units, mounted 11 ft. 4 in. high and spaced 9 x 12 ft. apart. The front units were fitted with 500-watt and the rear units with 300-watt lamps.

Striking results were obtained from the first, with the number of prospects and sales increasing immediately. Soon the dealer had to expand into an adjacent building, where a duplicate installation was made. New customers invariably remark that the lighting display attracted their attention.

Accompanying night and day views tell the story. Passers-by can see more of the store and see it better at night than during the day, so excellent is the installation. Neon outlining attracts the attention of the passing motorist while he is blocks away.



Note how the interior of the store is visible from the street



In midday, only the first row of cars is visible

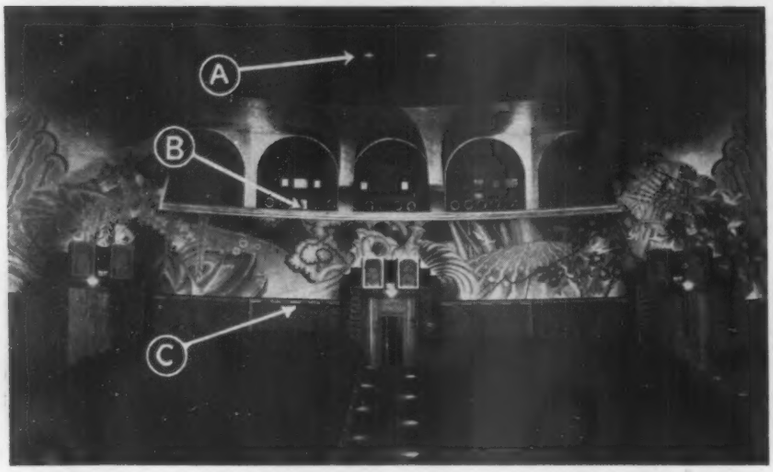
A Casino

Electricity Makes Catalina Isle's Temple of Pleasure as Brilliant and Colorful as the Famous Undersea Gardens Which It Overlooks

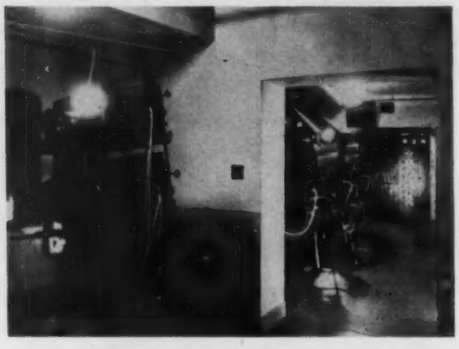
Above: Floodlights on an embankment above and in front of the building light the entrance way. Floodlights concealed in concrete-cast stone shells below each arch of the overhanging balcony light the rounded exterior. Colored floods in the ballroom promenade and the neon beacon cap on the dome make brilliant contrast, to be seen for miles

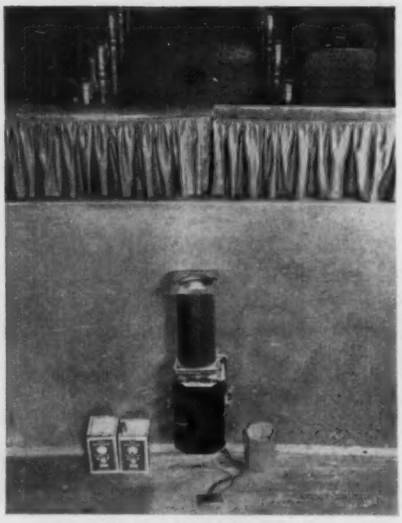
ALTHOUGH completed and opened more than a year ago, Catalina Island's Casino still remains one of the most outstanding and beautiful lighting and electrical installations in the world. Because it combines a 1,250-seat auditorium and theater, with a 2,500-couple dance floor atop of it, and embodies so many architectural inventions, it is absolutely unique. The architects, Weber and Spaulding, and the consulting electrical engineer, Thomas L. Nudd, provided William Wrigley, Jr., chewing gum tycoon owner of the island resort, with an advertising feature as distinctive as the playground Mr. Wrigley has provided the public.

Above: Looking down into the cove marked (C) below. This cove floods evenly the entire extremely difficult-to-light, silver-leaf-coated dome ceiling and the brilliant painted side-wall decorations. Below are shown (A) the slits through which the orchestra pit is lighted, and (B) the floods trained on the stage and curtain. At (C) are the dome lighting coves. Blended or pure red, green, and amber provide the entire range of color. This color symphony can be controlled and preset either from stage or projection room. Motor-driven grand master dimmers with resistance in the motor circuit for variation of speed can be operated remotely from stage or projection room



Below: Projection room, in foreground stereopticon and spot lights, in background sound moving picture projectors and house panel





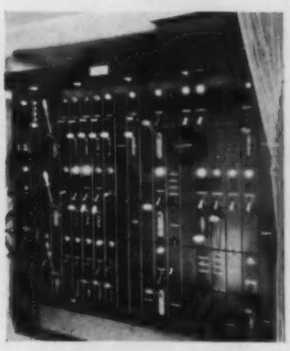
Above: Masked by a metal shield to light only the woman's figure above the proscenium arch, this spot in the orchestra pit creates a startling effect

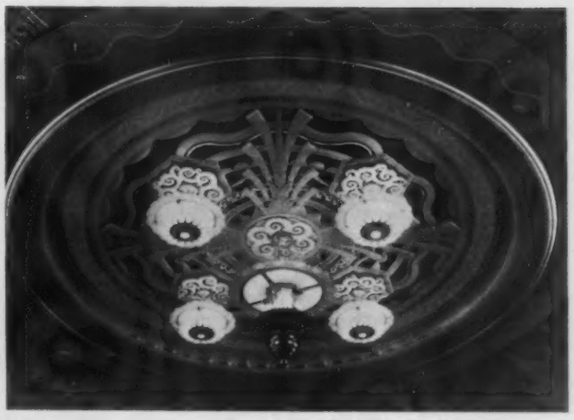
# of Neptune

CIRCULAR in shape, with a converging floor pattern and converging plain flutings along which colors are shot to a simple, yet beautiful center fixture, and surrounded by an outdoor promenade overhanging the water, from which blue "moonlight" sifts through long windows to the dance floor, the dancing pavilion above the auditorium is a never-to-be-forgotten spectacle.

Above: Refreshment soda fountain, with modernistic fixtures from which moonlight blue can be achieved as well as white light; controlled from the orchestra board, but metered separately for the concessionaire

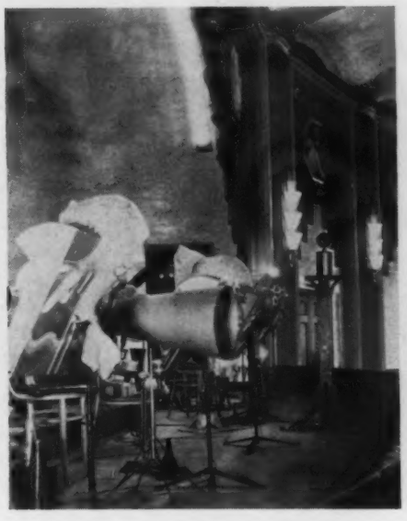
Below: Just off the orchestra stage is this complete stage panel for control of lighting effects over the dance floor and orchestra bowl

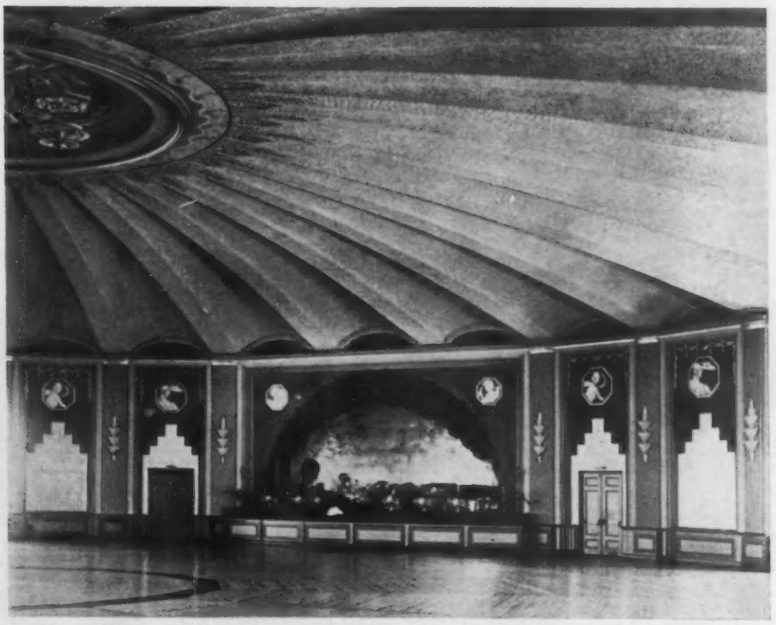




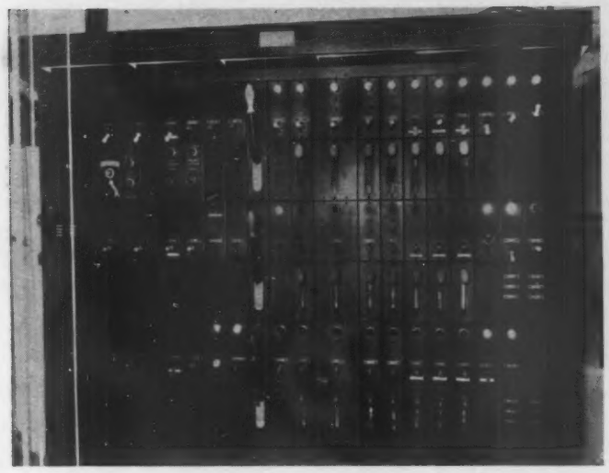
Left: Center ceiling fixture and ventilating grill. Pastel shades are produced on the ground glass plates of the fixtures by colored bulbs above the plates. A circular cove around the entire grill lights the grill itself in three colors. Spotlight beams from the spotlight room opposite the stage are broken and reflected like fireflies over the entire hall by the revolving, mirrored cone

Below: The orchestra bowl, silver-leaf coated, throws a million colored shadows in reflection from the border, foot, and goldfish-shaped orchestra music-stand lights

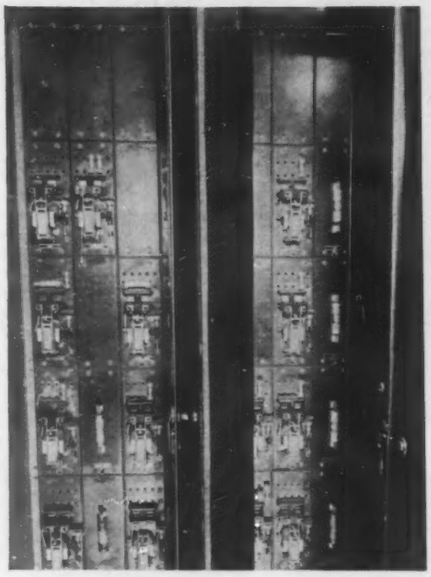




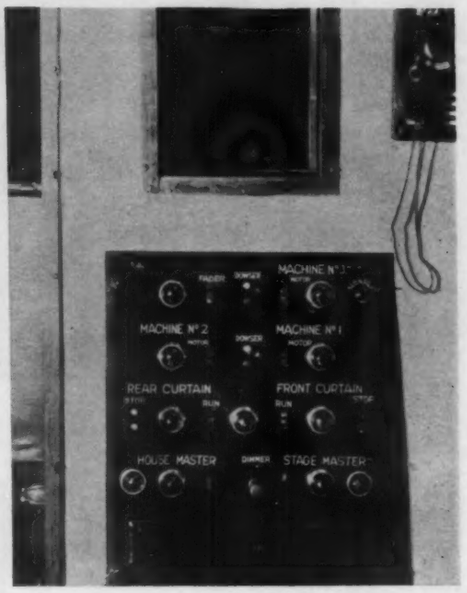
Above: A general view of the dance floor showing long, rough-surfaced flutings in the ceiling lighted from side-wall coves. Each fluting is lighted by seventeen concentrated-beam, chromium-plated floodlights, divided into three colors. Modernistic fixtures are mounted on each wall pilaster. Loudspeaker horns are mounted behind the two decorative plaster plaques over the orchestra bowl



BESIDES the features illustrated on these pages the Casino has a number of other unusual details of interest. Provision has been made for a new broadcasting station on Catalina Island and the broadcast room is already built for it. The lighting fixtures everywhere are done in the modern manner of ground glass and metal. They were designed and built by the Phoenix Day Company, San Francisco. In the entrance lobby the large fixtures are particularly attractive. Decorations throughout the building have a tang of the sea about them. The theater murals, the lobby ceiling murals, the incidental decorative motifs, and even the orchestra stands made to resemble the golden flying fish of surrounding waters, bear out this scheme. The building has a limited number of concessions, among them the soda fountain adjacent to the dance floor, and some basement shops. Dancing, however, is free to visitors to the resort.

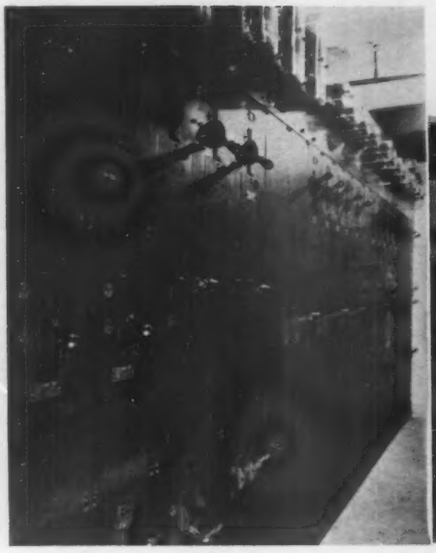


Above: Stage switchboard in the theater, provided to control both house and stage lighting. For ordinary moving picture performances, only the projection room control is operated



Right: Beside each projector and below an observation port is one of these remote-control boards. From these either projector may be started, stopped, dowsed for fade-in between machines, the "fader" for fading sound in or out on starting second machine controlled, both stage curtains operated, and house or stage dimmers operated from preset combinations. Telephones connect stage, pit, projection room, and office

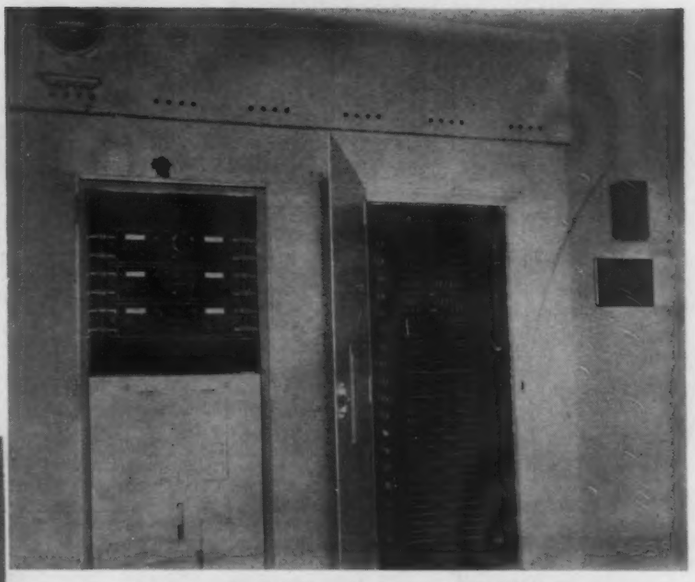
Above: Contactor panels are soundproofed by double metal walls padded with Celotex. Note door thickness



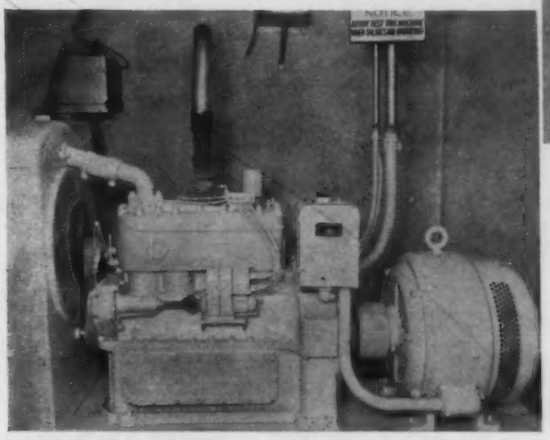
Main switchboard of entire building, located in the basement next to transfomer vault and gas engine auxiliary

Below: Transformer vault in basement with dual set of oil breakers and automatic changeover to switch load to either of Catalina Island's two sources of supply in case of failure on one line

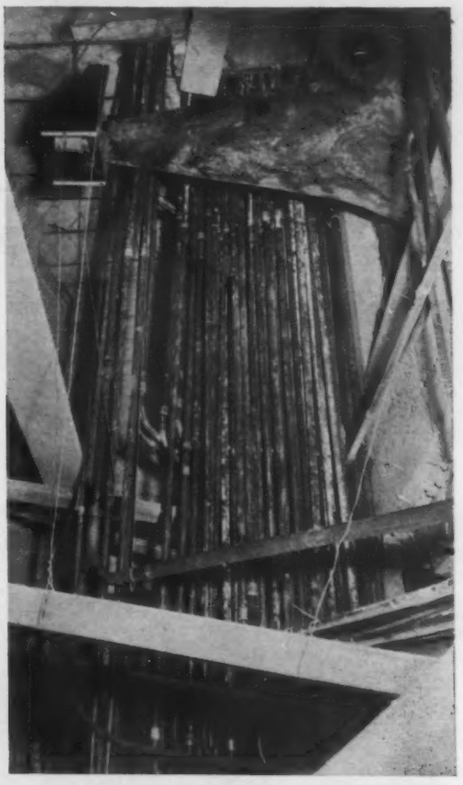
ELECTRICAL installation at the Casino was made by the English Electric Company of Los Angeles under the supervision of the consulting electrical engineer, Thomas L. Nudd. The lighting equipment and panels, including main switchboards, were of Major Frank Adam make in all cases. Power is supplied from the two sources provided on the island by the Catalina Island Company. The gasoline engine auxiliary is Sterling motored



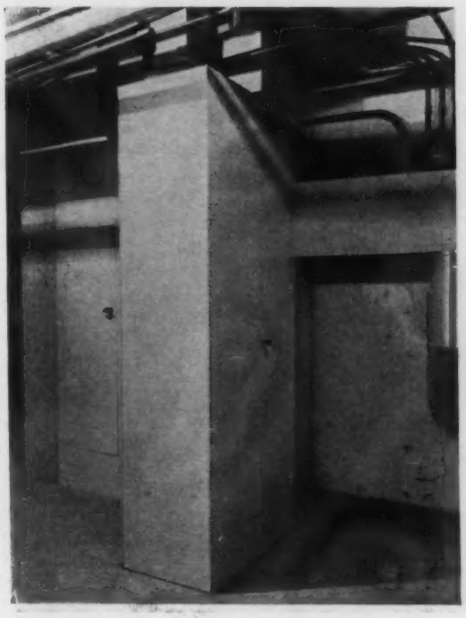
Above: To meter tenant concessionaires separately, this special Frank Adam metering panel is used. Separate meters can be set above, where one is shown installed. Each meter is separately fused in the left panel, which also contains the main switch and fuses. Circuits can be combined or switched to different meters by changing plugs in the lighting panel, right



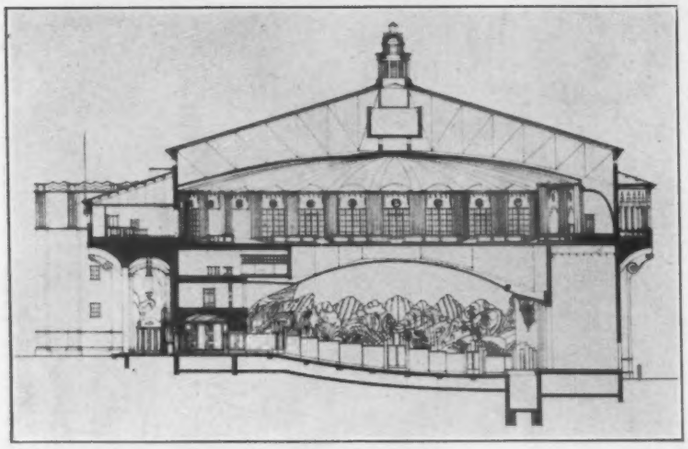
Above: Gasoline engine driven, automatically started, auxiliary generator of 10-kw. capacity, sufficient to carry temporarily emergency lighting for both auditorium and dance floor. This unit is tested every day, started by a pilot lighted button in the projection booth before each performance



Above: Some idea of the intricacy of the dance-hall lighting can be gained from this mass of 2-in. conduits feeding each ceiling fluted cove. One conduit serves each cove with its 17 reflectors. The horn is one of two public address system horns located at each side of the orchestra stage and concealed behind medallions. Organ music from the theater, radio programs, etc., can be broadcast from it over the dance floor

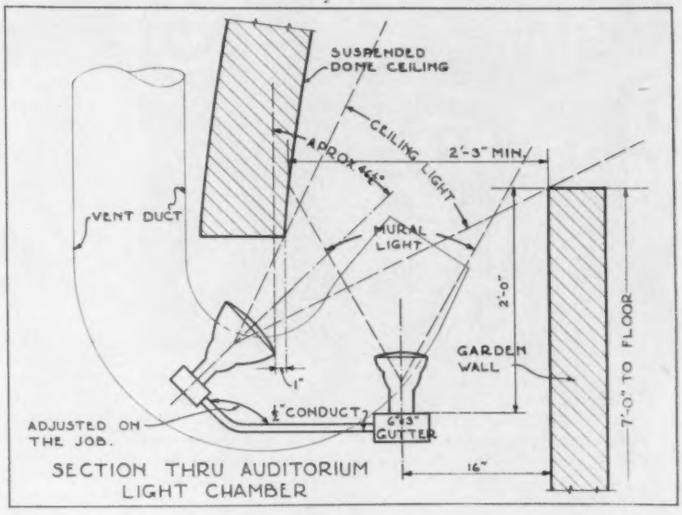


Left: Neat metal-enclosed cabinets fed from gutters shown in the background, housing power and lighting panels in the basement of the building for ventilating and pump equipment



Left: A cross-section through the Casino building shows the respective locations of the auditorium and the dance floor above it. At the extreme left is shown one of the two projections from the circular building which house the ramp by which the dance-floor level is reached. At the intermediate level above the dome of the theater the check room is located. On the level below that and opening into the theater are the projection rooms and the manager's office, glassed in so that the performance may be observed from this "balcony" position. Outside the dance floor may be seen the outdoor balcony promenade. Above the dance hall ceiling is the ventilating equipment topped by the beacon cap of the building

Right: Diagram showing the positions of units used to light the theater auditorium ceiling and mural decoration relative to the garden wall which masks them. Between every group of three colored lighting units a ventilating duct inlet jet is located. As the units employed to light the upper ceiling are mounted on a piece of conduit extending from the wiring gutter, adjustment of the units is made by bending this conduit slightly



Below: Looking toward the stage in the auditorium, this picture gives only a fragmentary idea of the effectiveness of the decorative scheme. On the silver-leaf-coated ceiling, stars are painted. The murals at the sides also sparkle because they are painted upon the silver background. The lighting of the decorations by means of separate units gives the effect of making the murals stand out from the ceiling itself, a stereoscopic effect. As previously described, the woman's figure over the proscenium arch is spotlighted from the orchestra pit by a spot so masked as to light the figure only. The entire atmosphere is quite nautical in character, the decorative murals giving the appearance of strange underwater vegetation

Thin-Wall Conduit Under Field Test

Electrical Committee Has Approved Certain Sizes of New Material for Use in Walls and Concrete Masonry

PROOF of the pudding is always in the eating—and the digestion thereof. Proof of the practicability of a new wiring method or material is to be found in an actual installation and how it stands up under field conditions. Consequently considerable interest has centered around a number of test installations of thin-wall metal conduit installed in non-incorporated cities or areas in the West. Contractors everywhere have been asking themselves whether the new material would survive construction hazards, meet requirements, and hence be successful.

The installations shown on this page were all made in the San Francisco Bay area: One at the Presidio military reservation, in a new chapel building of reinforced concrete; another near Ross, in Marin County, for a large residence. Other Marin County installations not shown here are in homes in San Rafael and a concrete house in San Anselmo. The Marin County houses were all wired by the North Bay Electric Works, San Rafael contractors who are enthusiastic over the material. The Presidio chapel was wired by the Johnson Electric Company of San Francisco.

Since these installations, word has been received that at the recent meeting of the Electrical Committee of the N.F.P.A. to frame changes for the 1931 National Electrical Code, the use of thin-wall conduit was approved for concealed work and in concrete in sizes up to 2-in. These changes have been summarized by James S. Mahan, former electrical inspector and now field engineer for Steel and Tubes, Inc., manufacturers of this product, in the following:

508-e Pipe Size Increased to 2 in. in diameter. This change makes it permissible to use electrical metallic tubing in sizes ¾-in., ½-in., ¾-in., 1-in., 1¼-in., 1½-in., and 2-in. The ¾-in. size is confined to underplaster extensions only, as set forth in section 510 of the Code.

508-h Voltage Limit Increased to 300 volts. This change eliminates the 150-volts-to-ground limitation and makes it possible to use this material on 220-volt, 3-phase systems.

508-h Wire Size Increased to No. 6 A.W.G. This permits use of metallic tubing on installations of greater capacity.

Above: In concrete construction the tubing is strapped to the form. The sleeve type fittings make a waerproof joint when tightened. Right: In wooden joist construction the material takes a smaller notch and is easiliy bent to desired shape. Bends can also be taken out

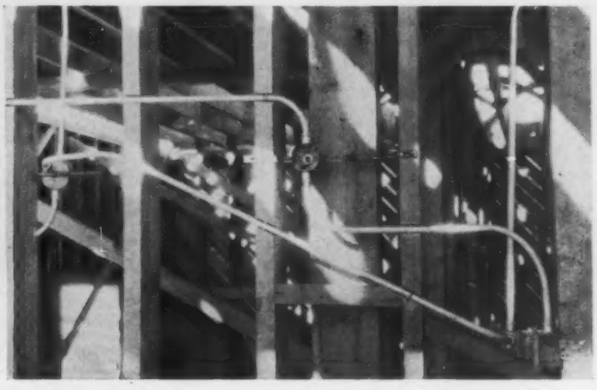
Two types of hickey are available, one for ordinary bends, and that shown at the right for short, sharp bends. Below: The tube adapts itself easily to intricate building contours such as in this bay window

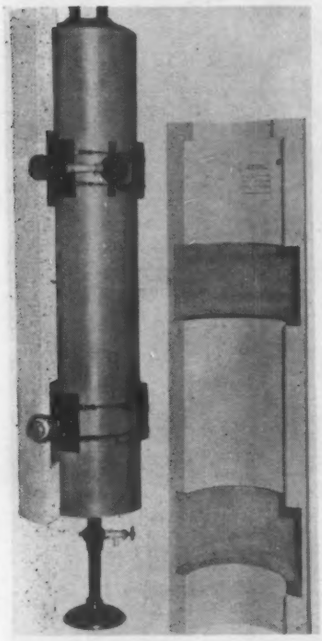
508-i Concealed Construction is permitted, that is in all ordinary joisted and other types of building construction embodying inaccessible spaces in the walls and ceilings.

508-i Concrete and Masonry Walls. Electric metallic tubing may now be buried in concrete, other than cinder concrete, or buried in masonry walls. This revision permits the tubing in all types of concrete or other masonry construction except where cinders are used in the mixture.

508-n Number of Wires in Pipe. The table in this section is to be the same as the revised table for the standard style of conduit of the same diameter, except that no conductor larger than No. 6 may be used.

In cities wherein changes of the National Electrical Code automatically become changes in the local ordinance, as is desirable under the uniform ordinance idea, these new rules will become effective. Whether the manufacturers' claim for a 25 per cent reduction in wiring cost resulting from labor time saved and material cost saved will result from a more extensive use of this material is something which the industry is interested in finding out.





Typical installation, with two heater-thermostat units

Utah Company Tests Its Water Heating Practice

By **H. M. Ferguson**
Assistant to Vice-President in Charge of Sales,
Utah Power & Light Company

AT THE beginning of 1929, the Utah Power & Light Company began offering electric water heating service where electric ranges were in use, with the introduction of the following monthly rate schedule: $1.25 for four rooms, 20 cents for each additional active room, plus 300 kw.-hr. at 2½ cents, and the remainder at 1½ cents.

Equipment chosen for this activity was the clamp-on heater and fiber-form insulating tank covering, the standard installation consisting of one 1,000-watt heater and thermostat placed one-third of the tank length from the top, and a second 1,000-watt heater with manually controlled snap switch located near the bottom of the tank already installed in the home. The thermostats were designed to maintain a water temperature of between 120 deg. and 160 deg. F.

At the end of 1929 about 1,100 installations had been made, and at the end of 1930 about 1,200 more had been put in, making a total number of installations on Jan. 1, 1931, of approximately 2,300.

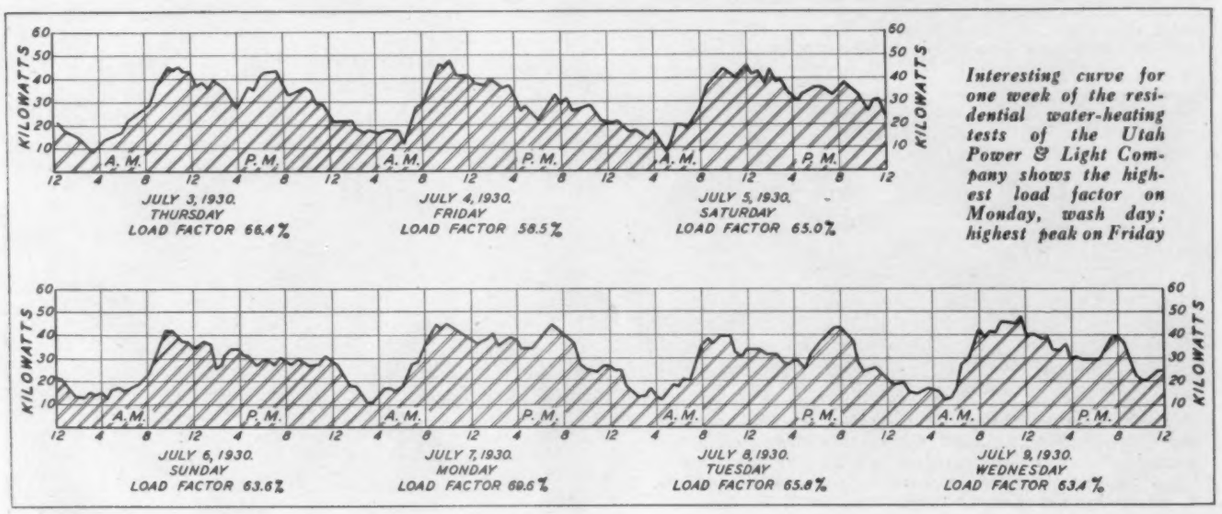
During the summer of 1930, a test was made of 65 representative installations for the purpose of determining the maximum demand and diversity and also the general nature of this load. The choice of these 65 installations was made very carefully so that the result obtained would fairly reflect the average that might be expected with a larger number of installations. Installations were listed by number of rooms, size of total monthly bills, etc., and then the proper number of each class in proportion of this class to the total number of installations was selected. Those tested included:

Classification of Houses	Number and Size of Tanks
10 4-room houses	1 10-gal. tank
30 5-room houses	7 30-gal. tanks
16 6-room houses	44 40-gal. tanks
3 7-room houses	10 50-gal. tanks
2 8-room houses	1 80-gal. tank
4 9-room houses	1 100-gal. tank
65	1 150-gal. tank

Of the 65 tanks, 62 were of 2 kw. each, two were of 1½ kw. each, and one was rated at 1 kw., a total of 131 kw. of active connected load, without considering load-limiting devices such as double-throw switches.

In each case, a graphic recording wattmeter was placed in the water heating circuit for one week and the results plotted to show the simultaneous demand on the system. The curve speaks for itself.

The average maximum demand after diversity was found to be approximately 0.7 kw. with the average maximum individual demand, 1.25 kw.



Interesting curve for one week of the residential water-heating tests of the Utah Power & Light Company shows the highest load factor on Monday, wash day; highest peak on Friday

Dealer Starts New Spanish Custom

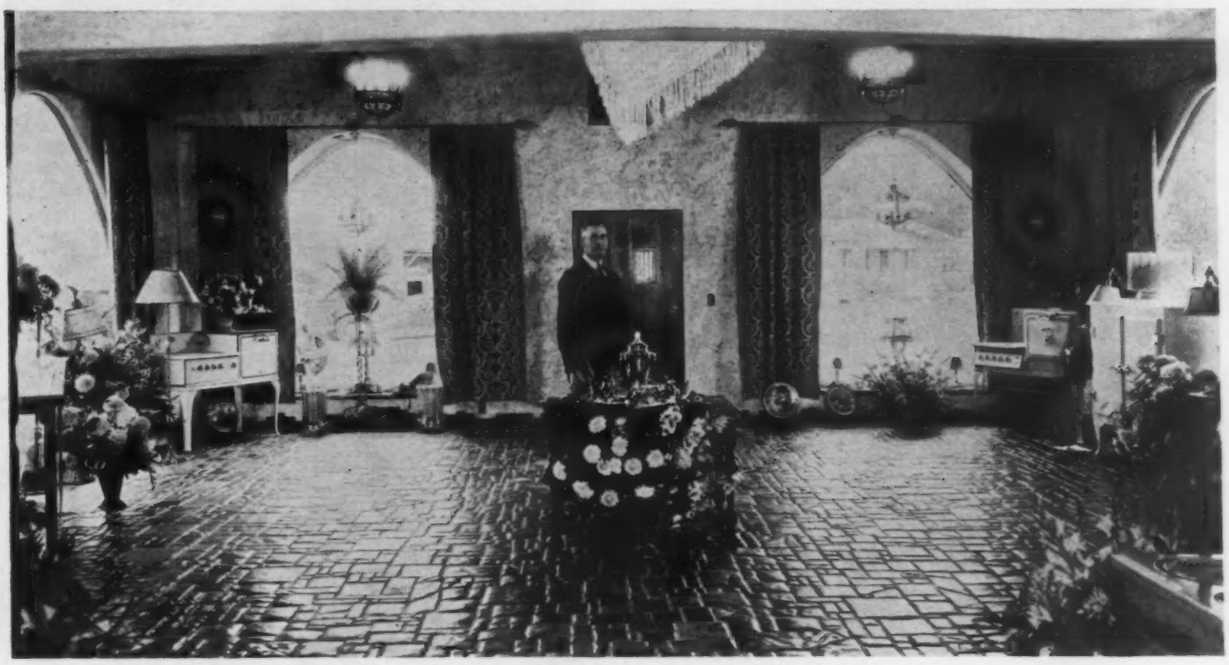
TYPICALLY Spanish, this new home of Pajaro Valley Electric Company, at Watsonville, Calif., is one of the most beautiful electrical establishments in the West. Outside, the cement walks are cut to resemble cobblestones, and arched windows permit ample vision into the salesrooms. Inside, the floors are of irregularly-laid tile in Spanish colorings, showcases and furniture are of old Monterey design, and a hewn balcony overlooks the salesfloor from the mezzanine.

Underneath the balcony, which leads to an office and the estimating and drafting room, are a ladies' room and another office, centered by an archway that leads to the fixture room and the shop and stockroom. The former is finished entirely in redwood; the two latter, unelaborate, are models of simplicity and convenience. Pipe, conduit, and other mechanical stock is carried in a building to the rear of a large, graveled back yard, adjoining a three-car garage.

Illumination, from fixtures hung for both utilitarian and display purposes, is augmented by colored lights which illuminate the balcony from beneath, and neon outlining of the windows. Heat is supplied, when needed, by small electric units.

Above: Facade of P. V. Electric building. Note similarity of lawn and window design. Below: interior view, looking back

Below: Another interior view of the attractive building, with H. L. Purtill, proprietor



Organized to Speed Orders

FROM the experience gained in the building and remodeling of several of their offices in cities on the Pacific Coast, the General Electric Supply Corporation believes that it finally has obtained, in the new Seattle store, the acme of ease and celerity in handling customers' orders. From the top of the three-story building to its full-size basement, provisions have been made to minimize waste motion and to conserve time.

One of the display rooms to which dealers may bring customers to inspect larger lines than the dealers themselves may carry

Chutes connect all departments where transfer of supplies is made and materials are placed where they are most immediately accessible for delivery. For instance, the pipe racks are placed just inside the rear doors of the shipping room. From here, pipe can be placed on trucks with few steps. Next to the chute table is an empty-box shelf where all empties are stored so that the shipping clerk need waste no time in hunting a container in which to send broken-package goods.

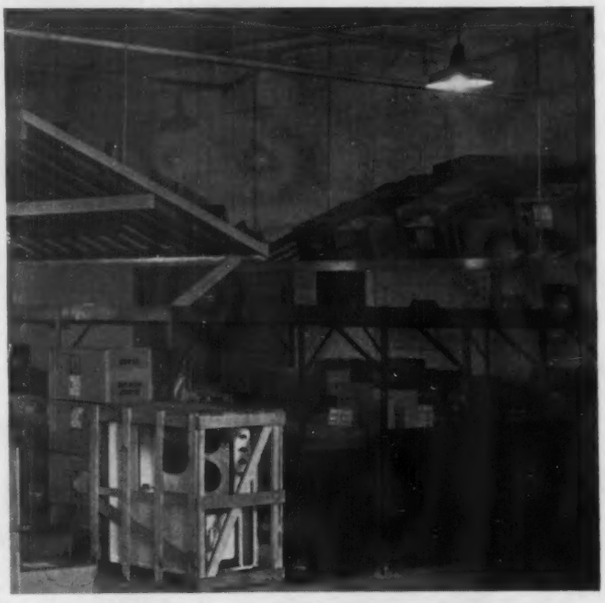
Details of the supply company's new office show many an excellent feature. On the ground floor, to the left of the entrance, is a pick-up counter served from racks of adjustable metal shelves. Behind the racks is the broken-package department, separated by a partition from the shipping and receiving room. The pipe racks

Broken package department. Small trucks find good use here

Ladies' room contains conveniences for recreation

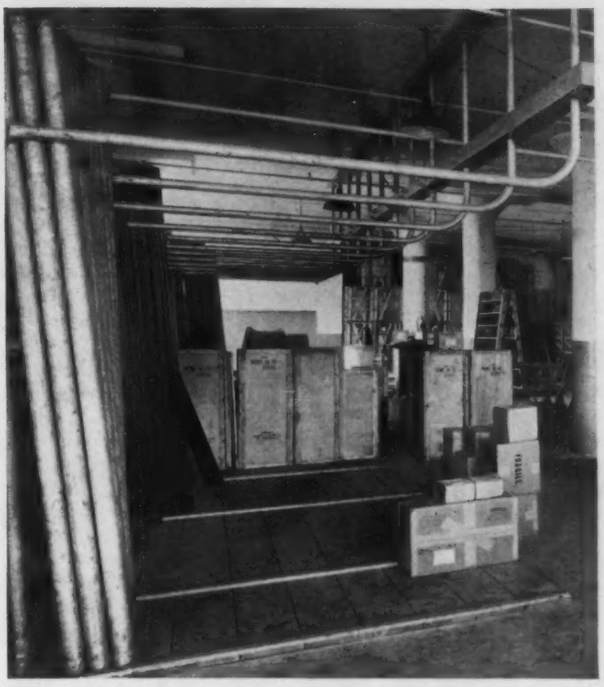
are in this room. A spur track with room for two cars runs along the back of the building, while parking space for customers and a private driveway for trucks to load and unload are located on the north side.

Main offices are on the second floor. Here are desks for twelve salesmen and partitioned offices for A. J. Lutz, Seattle manager; F. A. Block, sales manager; D. L. Plantz, division auditor; and the cashier. Space for the clerical department is provided by a large office in a corner of this floor. Large display rooms where all types of appliances and materials—radios, ranges, water heaters, washers, ironers, clocks, household devices, line materials, and wiring devices—are shown to best advantage are a feature here. Dealers use these rooms to show customers the complete line of any appliance, often making direct sales from the stock. Often, too, dealers send customers with a card, the company salesman closing the sale for the dealer.



Empty box rack at end of chute in shipping room eliminates hunting for cartons in which to ship unpackaged articles

Use is made of part of the second and most of the third floors for the storage of package goods. Two spiral chutes run from this floor to the first, one to the shipping room and one to the broken-package department. Ladies of the staff also have their own restroom and kitchen on this floor.



Pipe rack, also in shipping room, is placed so as to save work and time

Heavy apparatus and line materials are stored in the basement, access to which is provided by a chute from the rear street and an elevator that runs from the basement to the third floor.

Throughout the departments where materials and appliances are stored and displayed, convenience of arrangement and accessibility have been the paramount factor provided for by A. H. Kahn, whose headquarters are in San Francisco and who designed the Seattle and other offices of the Pacific district. He has embodied ideas and conveniences in these warehouses which make them outstanding in appearance and efficiency, comparable with any in the country.

What's In a Tag?

MOST dealers, large and small, have been using tags, printed orders and forms, or some other means of recording the progress of a repair job brought into the store, but the practice of the Alfred E. Werry Electric Shop, Palo Alto, Calif., in systematizing the handling of repair work is singular yet simple.

Next to the desk in Mr. Werry's office are eight flat metal boxes open at the top. Over each pair of receptacles is the name of the man who specializes in the work called for by paper tags placed in the boxes. As an order comes in, a tag is filled out, deposited in one of the boxes for the repair man whose job it is; this man collects the tags as his work orders. When a job is completed, the tag is placed in the second of the pair of boxes. Charges are then computed and billed by the bookkeeper.

These tags are not destroyed, however, but are filed alphabetically according to the customer's name, so that they may be referred to should question arise even years after the order has been filled. This is enhanced by complete information concerning the work, for the tag contains the customer's name and address, any special messages he might have given concerning the work to be done, various items of materials, their cost, the date completed, necessary comments by the workman on the job, and the workman's signature. As some 13,000 tags are used annually, this dealer has a complete information file on the electrical work of nearly everyone in town.

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Displaying Frigidity

THE "show window" type of outdoor board which has become so popular is used to advantage by the Standard Furniture Company, Seattle, in displaying either single pieces of electrical equipment or full-room groupings of furnishings. In this instance the board shows to advantage an electric refrigerator.

"Milliamperitis" Sells Radio Tubes

WHILE radio receiving sets have been on the market for a considerable number of years, it was not until 18 or 24 months ago that radio sales stepped up to any surprising volume. Radio was practically unknown one month, and six or eight months later became, in many instances, the most profitable item of merchandise handled by electrical dealers and central stations.

The sale of radio tubes has been dwarfed by the sale of receiving sets and, as far as the British Columbia Electric Railway Company and its ten retail outlets are concerned, has never amounted to a thing of importance. Radio owners have taken tubes for granted, but the time

OOOZOO
WHEEOW
FUZZ
BUZZ
GARRK
IQUEE
BOOBRRR
VITVITVIT
ZEEEE
— PERHAPS YOUR RADIO TUBES HAVE *MILLIAMPERITIS!
The insidious thing about milliamperitis is that not only your best friend, but everybody else knows about it—when this dread plague attacks your radio tubes.
You see, it's this way: When a radio tube is attacked by milliamperitis it knows it. It whines and growls and yelps and moans and hisses.
And what happens to radio reception when a tube gets milliamperitis is nobody's business.
But which one of your tubes is the destroyer of your radio entertainment? That's another insidious thing about milliamperitis: you never know which of your tubes has it . . . but it's not hard to find out. At "Granville at Dunsmuir" and at "Carrall at Hastings" we hold free clinics. Bring in your tubes for free testing. We'll locate the moaner for you, at no charge.
* Milliamperitis: An ailment not uncommon in radio tubes that have been in use about a year. A shortage of milliamperes — resulting in strange squawkings.
TAKE YOUR RADIO TUBES TO B.C. ELECTRIC STORES FOR FREE TESTING
A-28-10 30-7L
B.C. Electric STORES

This imaginary but dread malady, with the offer of free testing, has made the sale of radio tubes an important function of this company's merchandising department

now has arrived when a reaction to phenomenal radio sales will be felt in the sale of radio tubes.

To share in the profits of this reaction, the B. C. Electric company has manufactured a dread malady, "milliamperitis," which it is publicizing by direct mail. "Milliamperitis," the circulars advise, is a disease which attacks senile radio tubes and causes "that tired feeling." "Another insidious thing about 'milliamperitis,'" the copy suggests, "is that not only your best friend—but everybody else knows when your radio tubes have it." The success of this mildly burlesque "scare" copy was almost instantaneous.

Now, a set of tubes for a radio may cost $50 or more, and the company's advertising department assumes that a radio owner is apt to be satisfied with his tubes, weak as they may be, when faced with such an expenditure. So, it is subtly suggested that one tube in the set may have "milliamperitis." The owner is urged to bring in all the tubes for a free testing at any of the company's branches, with a view to locating the one that moans.

Previous to the release of the first mailing, the company's free testing of radio tubes averaged, over a ten-week period, 21 tests a day at all branches. An increase of more than 400 per cent was an immediate result of the first direct-mail release. On this increase hinges the company's sales advantage.

Immediately after the test, in which he finds that one or more of his tubes are affected by this imaginary disease, the customer finds himself confronted with a salesman who is ready to fill his every need. Proved in need of new tubes by the test and granted the privilege of paying for them with the next month's light bill, the customer usually replaces each faulty tube with a new one. So successful has been this plan that, comments John Taylor, of the merchandising department, "the radio tube business might well become more important than the sale of incandescent lamps to us."

Radio tube sales, too, are of a kind most favorable from the merchandisers' point of view, as there is no service problem and, when made on the free test plan, there is no delivery problem. This plan suggests possibilities to any electrical dealer selling tubes.

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Former Church Is Firm's Home

FROM a church which he bought and remodeled, Dudley J. Elkins has been supplying Colorado Springs, Colo., with the electrical contracting and merchandising services of his El Paso Electric Company. In remodeling the church into a suitable building for his organization, he

Formerly a church, the building of this contractor-dealer attracts much attention with its glass front and good lighting

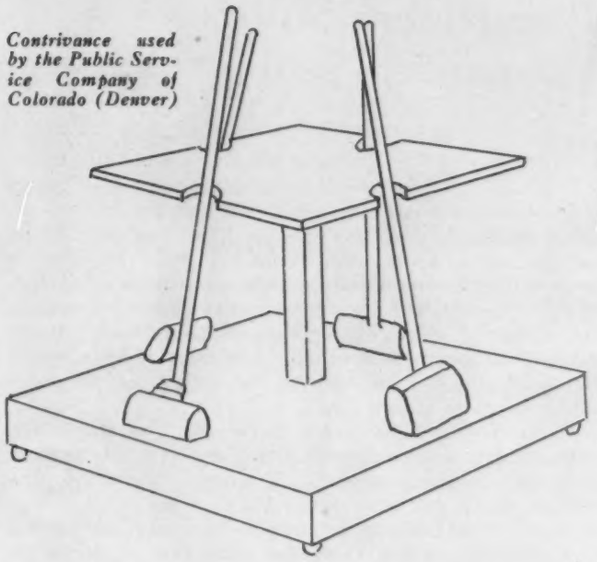
tore away the front and installed two show windows which run back 10 ft. on either side, making an almost entirely glass front. The lower window runs directly into the store, and the upper window is the front of an upper display room for lighting fixtures of all kinds.

In the upper display room, Mr. Elkins has designed ten 2 x 3-ft. booths in which are displayed that number

of ceiling and wall fixtures. Manipulation of a cord pulls a shade in front of the window, creating darkness and permitting the customer to see the fixture lighted as it will be in a home. By means of outlet wiring, any of 36 fixtures hung from the ceiling of the building may be lighted individually or in groups.

Another unusual feature is the home-made burglar alarm system of numberless small, almost unnoticeable buttons around the doors. Should anyone try to enter the building after hours, it would be almost impossible to keep from contacting one of the buttons, sending an alarm to the police department of the city. The system is controlled by a switch inside the building. As a further precaution, the building has been well lighted, including large outdoor signs and neon window outlining. These are controlled by an electric clock that not only keeps correct time but turns the lights on and off at a set hour.

"Let your Uncle Dudley do it," is the slogan of this dealer, who has been in business in Colorado Springs for thirteen years.



Contrivance used by the Public Service Company of Colorado (Denver)

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Displaying Long-Handled Appliances

LONG-HANDLED electrical appliances, such as floor waxers and polishers, usually are inconvenient to display on the sales floor. To stick them to one side of the room where their handles may be supported by the wall, reduces their sales appeal; leaning them against a counter case containing other merchandise reduces the sales appeal of the merchandise in the case by offering display competition.

A good plan is followed by the Public Service Company of Colorado in its Denver salesroom by the use of a special display fixture, which not only supports the appliances in a satisfactory manner, but also gives a separation of them from the displays of other merchandise.

The fixture consists of a double-shelfed platform, the upper shelf being smaller in area than the first, and containing notches around the edge to accommodate the handles of the appliances. The active part of the appliance rests on the lower platform, which is about four inches from the floor, and the entire contrivance is on rollers so that it may be moved from place to place on the sales floor for increased effectiveness, or shoved to one side when the floor is being swept.

Sufficient room is provided for the most effective display of one appliance on each of the four sides, and the entire length of the appliance is presented in a sloping position most convenient for customer inspection.

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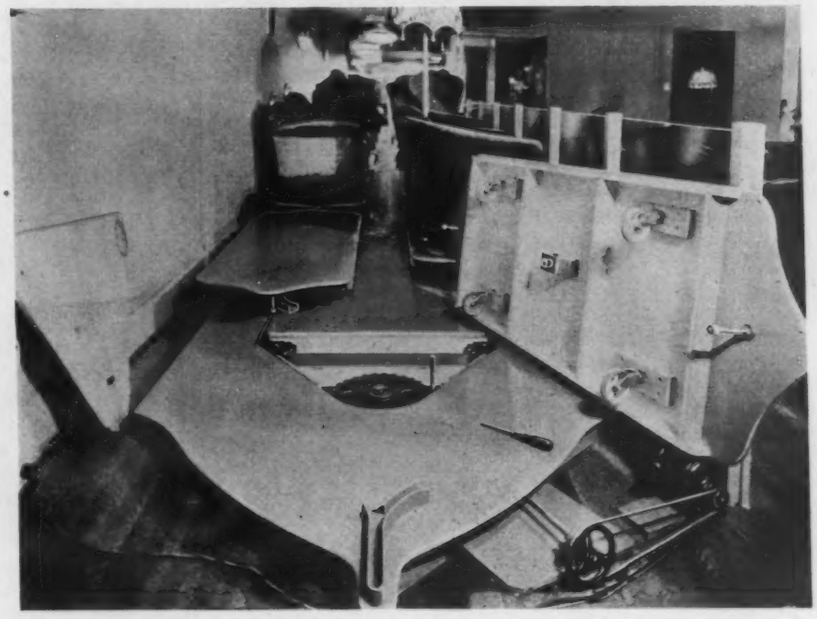
Moving Heavy Merchandise

PSYCHOLOGICAL reaction of an audience to a moving display, declared to be many times as great as the attraction for a stationary view, is the basis of an electrically operated merchandise exhibitor perfected by Joseph D. Bell, San Francisco manufacturer.

Oval shaped, it takes a ¼-hp. motor but three and one-half minutes to turn the 80-ft. exhibit platform, shown in the accompanying illustration, completely around. The platform consists of a number of flat cars, 7 ft. 5 in. x 5 ft. 6 in., mounted on rubber-tired, castor-socket wheels in a track. The flat cars, on which merchandise is placed, make a circuit from the rear of the store to the window, being swung around at each end by means of the cam arrangement shown on the bell-shaped platform in the illustration.



Mr. Bell has used the invention as a furniture displayer, but it is well suited for ranges, refrigerators, and similar heavy appliances.

Department Store "Dynamic" Selling

ELECTRICAL merchandising in department stores is usually successful. Although in some cases such stores have charged somewhat lower than dealer prices, depending on volume and quick turnover for profit. These establishments are a diminishing minority. Department store selling has been successful because, from experience in other departments, electrical salespeople have learned the essential rules of merchandising. Dealers could make their businesses equally profitable if they would but study the tactics used by the highly trained functionaries of the larger stores.

W. O. Woolston, electrical buyer for The May Company, of Los Angeles, explains his department's success in terms of dynamic appeal. "Eye appeal and suggestive display should get more consideration from the dealers," he says. "For instance, an orange-juice extractor on the shelf has little selling value, but place that extractor on a table with a tray of glasses, a pitcher, a couple of oranges, a neat sign giving the price, and perhaps an apt phrase regarding the convenience of the piece, and the turnover will be immediate."

First, of course, customers must be brought into the store. As Mr. Woolston explains his methods, "On special demonstration events we get in personal touch with our customers. For a small merchandiser this would be easy. Then in advertising the demonstration, we invite anyone having difficulty with this particular (and any other) appliance to come in and have the difficulty removed. People appreciate this and later become purchasers."

The May Company places tags on all its electrical merchandise, believing that it helps to sell. Many people are loath to ask the clerk the price of an article when they would buy if they knew the price was nominal.

When goods are displayed on tables, corresponding stock is kept beneath the table so that it is ready if a customer wishes to take the purchase with her. Moreover, this practice is an aid to keeping the stock up.

New goods, Mr. Woolston believes, must be purchased continually. Trade magazines are read for up-to-date information on the latest models of appliances. Customers know when articles are new and are impressed with a policy of "the first with the latest." By writing to the manufacturer, an article is sometimes secured before jobbers have been supplied.

The versatility of an appliance like a griddle is never appreciated until demonstrated dynamically

Educated clerks are needed, too. The May Company never hires a person without the equivalent of a high school education, a policy often lacking in small dealer stores. Moreover, new salespeople are taught the methods of sales approach in sales meetings. On the other hand, dealers who have one or two inexperienced clerks can suggest books on sales tactics for study by their employees in lieu of meetings.

"On repairs," this official explains," we go out of our way to give the best possible service. Profit is not the main consideration; good repairs on appliances mean the winning of a steady customer. On merchandise purchased in our department, regardless of the manufacturer's guarantee, we even go to extremes to satisfy the customer. It is not as expensive a practice as might be thought, for the losses of this service are absorbed by profits these same customers give us in other ways."

So simple are the practices which have made this store's electrical department successful that any dealer may copy and achieve the same atmosphere of dynamic appeal and fascination in his store if he will make the effort.

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Who Pays for The Raised Check?

By Ross Dudley, Attorney
Salt Lake City

JOHN A, head of the A Electric Company, paid a bill of $25 to a nearby printing establishment for a quantity of letterheads and envelopes. He paid in the usual fashion, by check, but in writing the check he forgot to fill the spaces after the figure $25 and after the word "twenty-five."

The owner of the B Printing Company indorsed the check to a third party, and it passed through several hands before it arrived at the bank. When it reached the

bank, someone had made use of the empty space to raise the check from $25 to $2,500.

Payment was refused by the bank since the A Electric Company did not have $2,500 on deposit. The holder of the check brought suit, claiming that he was an innocent third party who had purchased the check in the usual course of business and had no knowledge of the raising of the amount. He further contended that A, by carelessly leaving unfilled space after the figures $25 and after the word "twenty-five," was liable because of negligence which allowed the check to be raised.

Can A be held for the $2,500? The federal courts and the majority of the state courts hold that A is not liable for the raised amount. They say that the cause of the

alteration of the check is not A's negligence, but the crime of the forger. A few states follow the opposite rule.

Though liability may generally be escaped on a raised check, leaving unfilled spaces after the amount is a decidedly poor practice. If a check protector is not used, the spaces should be filled by heavy ink lines. Checks should never be written in pencil.

However, the maker of a check is held liable for the full amount of the check when the amount blank is left for a clerk or agent to fill in. If the clerk or agent fills in for an excessive amount, the donor of the check is still liable for the full amount on the theory that the agent had implied authority to fill the blank.

Every electrical dealer should have a printed check book and pay all bills by check. An indorsement on the check as to what is being paid for is the best receipt possible, and generally eliminates any argument as to whether a certain item, invoice, or statement has been paid. Should the matter go to court, it is a valuable document in support of a case.

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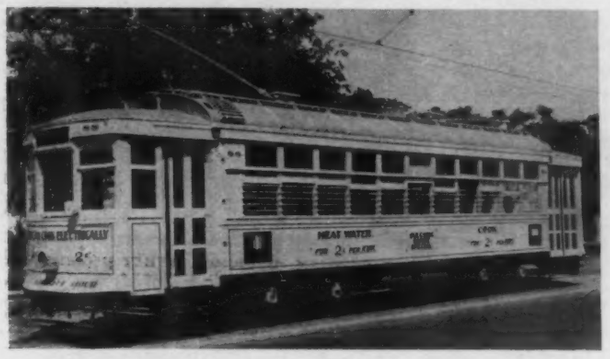
Advertise Ranges by Cooking on Street Car

PEOPLE in El Paso, Texas, whether they have a mania for eating in dining cars or not, were pleased when the *Electric Range Special*, a street-car on which passengers are served with meals as they ride, went into regular operation on the various lines of the El Paso Electric Company. The street-car kitchen is an unusual publicity stunt, unlike anything yet done to popularize electric cooking.

Some seats were removed from an old car, permitting the installation of an electric range, water heater, refrigerator, and a kitchen table in one end. A motor-generator, with resistance placed under the car, reduces the high voltage of the trolley wire for use in the kitchen. Passengers pay the customary fares and dine as they ride.

This rolling kitchen has been painted white inside and out and attractive slogans appear in the car, advertising the fact that one can heat water and cook electrically for the low rate of 2 cents a kilowatt-hour. Suitable signs on the outside of the car and on the dashboards stress the same selling points for electric appliances. The car is operated by a special motorman, dressed immaculately in white, and the menu is prepared by a home economist of the company, assisted in serving by a maid.

The kitchen on wheels makes regular trips daily, except Saturday and Sunday, over various city lines in El Paso. Informative advertisements in the newspapers give the schedules and routings from day to day.



The Electric Range Special, *the new traveling salesman*

Inside the car is the kitchen where a home economist prepares th food, a maid serves it, and commuters feast. The immaculate whiteness of the interior tells the secret of an all-electric kitchen

The idea back of this plan is to familiarize the layman with the efficiency and labor-saving qualities of electric appliances, chiefly ranges and water heaters. The company is stressing the use of full electric service in the home, to take advantage of the exceptionally low rate of 2 cents per kilowatt-hour.

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"ELECTRIC SERVICE for Hotels and Office Buildings," N.E.L.A. bulletin of the general power committee, is a guide for architects and engineers in selecting a source of electric service. The report generalizes on the application of purchased service, brings out tangible and intangible advantages of such service, and indicates methods used to obtain fundamental data necessary for a study of such services. Actual operating data of buildings and hotels are given, with illustrations and figures on economies which have and can be effected with electric service. The bulletin may be obtained from association headquarters at 420 Lexington Ave., New York.

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Santa Fe Teaches Maids

HOUSEMAIDS have a definite place in determining the success of any cooking school, believes J. E. Flynn, business manager of the New Mexico Power Company at Santa Fe. In this part of the Southwest nearly every home has an Indian or Mexican maid. For this reason, a special "Maid's Day" is a part of each demonstration session and this company's officials believe that a cooking school without a successful "Maid's Day" is an indication of failure.

This conviction is prompted by the fact that, because the maid's class is held the day before the close of school, the number of maids in attendance and their enthusiasm indicate the interest which the better class of home owners are taking in the school. If the attendance is small, little interest has been paid by mistress; if attention by the maids is divided or reluctant, the lady of the house has probably recommended the school with a casual air. The reverse is equally true.

Another reason why attention is paid to the servants is because the duty of the maid requires her to use the appliances. Her success with them influences the mistress in her evaluation of their usefulness. The class is small and more individual application is given, bettering the chance of proper usage. Unusual appliances are stressed, it being taken for granted that the more common appliances are already in use. The language used is simple, there are less "simply delicious" descriptions; instead definite instructions are given.

Oregon Governor's Power Program Finds Support in Recent Legislation

PASSED by the Senate at the extra session of the Oregon Legislature and subsequently signed by Governor Meier, three "administration power bills" have been enacted into law in that state. Repeal of that part of the former public utility law providing for certificates of convenience and necessity is effected in a fourth bill that also bears the governor's signature. Before passing the latter measure the Legislature acceded slightly to the wishes of the operators of small utilities who were opposing the repealing movement by amending the bill to provide that the certificate clause will still be applicable to municipalities having 2,000 population or less.

Public Utilities Bill

One man in place of three, and this man with a special mandate to represent the users of service and the public generally, now sits as the regulatory authority over the valuation, rates, and service of the public utilities operating in the State of Oregon, according to the new Public Service Commission Act signed by the governor Feb. 28. The act carries the emergency provision which made it effective immediately, and the governor has appointed C. M. Thomas, Medford, Ore., attorney, to the newly created position of "Commissioner of Public Utilities of Oregon." Simultaneously the tenure of office of Hal D. Patton, H. H. Corey, and O. C. Bortzmeyer, members of the former Public Service Commission, ceased.

The clause in the new act attempting to make the new commissioner an advocate of the people is as follows: "In addition to the powers and duties now or hereafter transferred to or vested in the commissioner, it shall be his duty to represent the patrons, users of the service, and consumers of the product of any public utility, and the public generally, in all controversies respecting rates, charges, valuation, service and all matters over which he has jurisdiction, and in respect thereof it shall be his duty to make use of the jurisdiction and powers of his office to protect said patrons, users, and consumers, and the public generally, from unjust and unreasonable exactions and practices and to obtain for them adequate service at fair and reasonable rates."

Another principal difference between the old and the new law is found in the limited home rule provision of the new law. This permits incorporated cities to fix by contract or ordinance the rates and charges applicable within such cities. Any such proposed contract or ordinance must then be filed with the Commissioner of Public Utilities who may submit written objections to such contract if he believes it not to be in the public interest. If such objections are filed within 90 days, the contract or ordinance must be submitted to a vote of the qualified electors of the city or town concerned before it can be effective.

A further change effected by the new act gives the Commissioner of Public Utilities jurisdiction over contracts between two utility corporations "with relation to the construction, operation, maintenance or use of property . . . . or for service, advice, engineering, financing, rentals, leasing, or for any construction or management charges" under conditions in which one of the contracting utility companies owns a majority of the voting stock of the other contracting company; or when a majority of the voting stock of either company is owned by a third corporation; or when a director or officer of either contracting party has a pecuniary interest in the contract. Such contract will not be lawful under the new act if the Commissioner of Public Utilities finds that its terms are contrary to the public interest.

The new act was put through as part of the governor's power program in which he promised, before election, to abolish the Public Service Commission.

Enacted in Oregon

FOUR bills passed last month by the Oregon Legislature translate into law the governor's announced administration power program:

1. House Bill No. 77, creating the office of "public utilities commissioner," replacing the former three-man Public Service Commission.
2. Senate Bill No. 62, revising the law under which water appropriations can be made, and creating a hydro-electric commission consisting of the state engineer and two commissioners appointed by the governor to serve without pay.
3. Senate Bill No. 64, making effective the "People's Utility Districts" constitutional amendment passed by the electorate last November.
4. A bill providing for the repeal of the existing public convenience and necessity law.

Water Conservation Act

Modeled after the Federal Water Power Act, Senate Bill No. 62, the "Water Conservation Act," gives the State of Oregon a new water appropriation code, and creates a hydro-electric commission of three members with authority to pass on all applications for appropriation of water from Oregon streams for power purposes. B. L. Eddy, Roseburg, E. F. Slade, Salem, and C. E. Stricklin, state engineer, will constitute the commission. Mr. Eddy is a member of the state Senate and an attorney, and Mr. Slade is president of the First National Bank of Salem.

Under terms of the legislative act, the newly created commission will exercise absolute jurisdiction over construction and financing costs of power projects, with special authority over all power projects built by private capital. Members of the commission, except the state engineer, will sit only as occasion demands to pass upon power applications.

An annual water power tax of from 25 cents to $1 per horsepower developed under license in accordance with the act is levied. Conflict with the Federal Water Power Act in several particulars throws doubt around the legal effect of this bill.

People's Utility Districts

A "voters' preliminary petition" to the state hydro-electric commission, a hearing and report by the commission, a "voters' final petition," and an election are the steps in the process of forming "people's utility districts," according to the "District Power Bill," just passed, complying with the mandate of the constitutional amendment passed by the people at the last general election in November. (See Electrical West, Dec. 1, 1930, p. 312, and March 1, 1931, p.150.)

Government of the district is vested in five elected directors who have broad powers in the establishment of power systems. The powers of these directors include the levying of taxes, subject to the 6 per cent limitation in the constitution of the state; the issuance of utility bonds, when authorized by vote of the people of the district and in aggregate amount of not more than 10 per cent of the assessed valuation of the property in the district; and the power of eminent domain.

Of particular significance, in the light of the hysteria on the question of the public development of water power of the state displayed prior to the last election and since, is the clause in the utility district law providing that "all the property owned and/or controlled by people's utility districts under the provisions of this act shall be assessed and taxed in the same manner that privately owned utility property is assessed and taxed." In this connection it is interesting to note that a bill to tax existing municipal utility property failed in the recent session of the Legislature, but that an interim committee has been appointed to study this problem and make a recommendation to the next Legislature whether and to what extent such property should be taxed.

Forest Grove vs. Portland General Electric Company

Illustrative of the peculiar workings of a law passed by a state Legislature bent on offering encouragement to municipal power enterprises is the case of the City of Forest Grove, Ore., against the Portland General Electric Company seeking to restrain the company from entering territory adjacent to the city, and now being served by the city municipal plant, for the purpose of giving 35 petitioning customers service at rates averaging better than 33 per cent less than the rates of the municipal system. The law referred to is the repeal of the provision for a certificate of convenience and necessity in the regulatory statutes of the State of Oregon, which for years had kept the Portland company out of the territory adjacent to Forest Grove in spite of the petition of certain customers seeking the advantage of the lower rates of the company. This repeal opened the way for the company to accede to the desires of the petitioners and extend its lines into the territory on the basis of its regularly filed extension policy.

An injunction suit brought by the city to restrain this action on the part of the company failed in the preliminary hearing in the circuit court to the extent that the question of law has been decided and it remains only to establish the fact that Forest Grove and the surrounding territory now served by the municipal plant constitutes a territory having more than 2,000 population. This fact, now reasonably assumed since the 1930 census gave Forest Grove proper 1,859 population, must be proved, because of the 2,000-population clause in the new public convenience and necessity measure. Proof of this question of fact is simple, and it is assumed that the power company will win its case under the new law, which will tend to throw light on the advantages of private versus public operation.

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J. D. Ross Dismissed From Seattle City Light Department by Mayor

JAMES DELMAGE ROSS, superintendent of the Seattle City Light Department for the past twenty years, was summarily removed from office by Mayor Frank Edwards on March 9. The mayor's action was taken on the eve of the city election, at which the voters of Seattle passed with a majority of 2,000 votes a measure proposed and fathered by Mr. Ross, providing that all engineering work for the City Light Department be placed under City Light supervision instead of in the hands of the city engineer, as at present.

This measure was strongly opposed by the mayor and Oliver T. Erickson, president of the city council. Mr. Erickson, who was up for re-election, was defeated, as were all the other candidates who had publicly attacked City Light and Mr. Ross.

Dismissal of the "Father of City Light," has aroused widespread critisim in Seattle, and has resulted in the threatened recall of the mayor who twice in the past has re-appointed Mr. Ross to head City Light.

Charges preferred against Mr. Ross by the mayor are that "he has been inefficient and disloyal to the city's best interests, extravagant and wasteful in the matter of public funds; failed to co-operate with the city council, board of public works, and the mayor," and specifically that he failed to "provide suitable right-of-way for the early construction of transmission lines for the Skagit power plant."

Mayor Edwards' charges are denied by Mr. Ross in full. Referring to the matter of right-of-way, he says:

"I have urged the mayor and city engineer to go on with the construction of the transmission line. The towers can be erected at once. The small portion of property not yet acquired for the right-of-way need not hold back this work, as the courts have been giving the awards rapidly. It will be two years before there is a power house at Diablo, and it will take only a year to build the transmission line, so that the right-of-way will be ready in plenty of time."

J. D. ROSS
"fired" by Seattle mayor

Mr. Ross entered the employ of the City of Seattle in 1903 as an electrical engineer, conducting the design, construction and initial operation of the municipal lighting system. He was first appointed superintendent of Seattle's municipal lighting department in 1911. When private interests bought up the power sites for which the city was negotiating on the Skagit River, he secretly filed on the Skagit site in the name of the city and went to Washinton, D. C., to press his claims. He then headed a campaign in Seattle to direct the citizens toward the development of a great industrial future, guiding the project through a series of strenuous political fights.

Named by Senator Norris in a bill introduced in January, 1926, as one of the three directors to supervise construction of the hydro-electric project at Muscle Shoals, Mr. Ross has appeared as an expert witness several times before the United States Senate. He is the author of several text books on electrical subjects, and is in constant demand as a lecturer on municipal ownership of lighting and power in the Northwest.

Immediately upon Mr. Ross's dismissal, Mayor Edwards nominated Armand F. Marion, chief engineer of the Pacific Coast Company, to succeed him. The city council, however, two-thirds of whose votes would be necessary to place a new City Light superintendent in office, adopted a resolution requesting the mayor to withdraw his nomination of Mr. Marion, stating that "under the existing circumstances," its members would confirm no one but Mr. Ross for the position. Unless Mr. Ross is reinstated, or the city council rescinds its action, City Light will operate for the next fifteen months under the direction of Glen Smith, assistant superintendent of the department.

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Six Companies, Inc., Bid Low on Hoover Dam

Signed government contract for the construction of Hoover Dam had just been received at the offices of the Six Companies, Inc., in San Francisco as this issue of Electrical West went to press.

Six Companies, Inc., with a bid of $48,890,995.50, was revealed as the low bidder when bids for the construction of the dam, including the tunnels and power house in connection with it, were opened on March 4 in Denver. The only other bids which met the requirements of the specifications were submitted by Arundel-Atkinson Company, of Baltimore and Los Angeles ($53,-893,878), and Woods Brothers, of Lincoln, Neb. ($58,653,107).

Comprised of six of the largest contracting and construction companies in the West, Six Companies, Inc., a $10,-000,000 Delaware corporation. is made up of the following: Utah Construction Company, Ogden and San Francisco; Henry J. Kaiser & W. A. Bechtel, San Francisco; McDonald & Kahn, San Francisco; Morrison-Knudson Company, Boise, Idaho; J. F. Shea Company, Portland; and Pacific Bridge Company, Portland. W. H. Wattis, president, Utah Construction Company, is president of the Six Companies, Inc.; F. T. Crowe, who was for many years construction engineer of the Bureau of Reclamation, is manager. Other officials are W. A. Bechtel, first vice-president; E. O. Wattis, second vice-president; Felix Kahn, treasurer; and Charles A. Shea, secretary.

The contract calls for actual starting of the construction work not later than

30 days after the acceptance of the bid. Preliminary work will be on the construction of four diversion tunnels, and then work will be undertaken on the upper and lower cofferdams. The tunnels are to be finished in two years, the dam in six and one-half years. Cement and structural steel are to be furnished by the government, power machinery by the contractors for power.

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Tax Placed on Energy Generated in Idaho

A tax of one-half mill per kilowatt-hour on all electrical energy generated in Idaho was levied by a bill recently passed by the Idaho Legislature The principal utility companies affected are the Idaho Power Company, Boise; the Utah Power & Light Company, Salt Lake City, Utah, which has generating stations in Idaho and purchases some power from the Idaho company; and The Washington Water Power Company, which generates power in Idaho at Post Falls and Lewiston.

All of the Western states have sought to transfer some of the tax burden from land to intangibles through income and excise taxes of one kind or another, but Idaho is the only one to have singled out one industry for special taxation that can have no other effect than to discourage development of the state's industrial possibilities.

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Arizona-Hoover Dam Suit Hearings Terminated

Washington Correspondence

Hearings in the injunction suit brought by Arizona in the United States Supreme Court to restrain the other Colorado River basin states and the Secretary of the Interior from carrying out the Hoover Dam project were closed before the court adjourned for a two weeks' recess on March 23. Since both sides were permitted to present their arguments, it does not seem probable that the case will be thrown out of court without further consideration of the evidence. The court meets again on April 13.

In asking that the case be dismissed, counsel for the Secretary of the Interior contended that Arizona would not be injured by the construction of the dam. It was also contended in behalf of the Secretary of the Interior that Arizona need not be concerned about losing its right to take water from the Colorado since, having refused to sign the compact with the other states, it is free to divert water as before adoption of the compact by the other states. The attorney general for the State of California pointed out that only one-half of the flow of the Colorado is put to beneficial use. He asserted that it is clearly within the power of Congress to adopt a measure designed to render the river navigable.

In the bill of complaint filed by Arizona, the Supreme Court is asked to decree that the provisions of the Colorado River compact are unconstitutional. Counsel for Arizona made the contention that the project deprives the state of its sovereign right to use the waters of the Colorado. The point was also made in behalf of Arizona that the state's right to tax private power development on the river is interfered with by the project, since the government's development will preclude any other work toward utilizing the power of the river.

The general opinion in Washington is that the constitutionality of the project will be upheld and that the injunction will be denied. During the argument of the case, however, it was indicated that an important issue hinges upon the right of California to divert water through the All-American Canal.

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Persian Gardeners

MEN whose electrical seed planting has resulted in a never ending blossoming of flowers of light at Sweet's Persian Gardens, the colorama installation at Oakland, Calif., are shown here. Left to right, they are A. E. Longmate, Edison Lamp Works; Leo G. Gianini, illuminating engineer, Edison Lamp Works, and designer of the installation; Ray S. Keefer, architect; and E. B. Cook, wiring materials specialist, General Electric Company. Unfortunately, B. R. Fritz, electrical contractor, was not present for this picture.

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Bill Would Disqualify Incompetent Engineers

Designed primarily to protect the legitimate engineer from competition by incompetents in the practice of his business, a bill just passed by the House and now being considered by the Senate of Oregon will affect the practice of engineering in that state. The bill is largely amendatory, as the authors propose revisions and additions to the existing law governing the profession.

Among these changes, the definition of a professional engineer has been simplified to make it more specific, and the examining board has been enlarged and re-allocated. No change in fees or in registration requirements is contemplated, but the requirements respecting non-resident professional engineers have been clarified by a new provision.

Columbia River Power Co. Asks 250,000-hp. Permit

Unique in many respects is the plan of the Columbia River Power Company, Seattle, for developing 160,000 hp. on the Columbia River between Cascade Locks, Ore., and Stevenson, Wash., without a diversion dam. The general plan is outlined in the company's application to the Federal Power Commission for preliminary permit, filed last month. The company, which was incorporated in the state of Washington in February this year, names the following officers: A. C. Frost, president; E. M. Belknap, secretary-treasurer; L. B. Donley, trustee. Stevens & Koon, consulting engineers, Portland, are consultants on the project.

The scheme proposes to construct along the Washington shore of the river an open canal 6,500 ft. in length with its intake about a mile below Stevenson, Wash., above the Cascades. This canal, which would be 300 to 400 ft. wide on the bottom and 75 to 90 ft. deep, would have its bed sufficiently low to divert most of the 90 per cent flow (about 90,000 sec.-ft.). It would deliver water to five tunnels about 7,500 ft. long and 40 to 50 ft. in diameter, which would discharge into a forebay, into one wall of which would be built the power house near the shore line of the river below the rapids. The difference in elevation between intake and tailrace is placed at 27 ft., which after losses in canal and tunnel would be 23 ft. net head on the wheels, or a capacity of 160,000 hp. 90 per cent of the time.

As a further development to be undertaken later, the application states that it is contemplated to build a dam approximately 13 ft. high below the intake which will increase the capacity to 250,000 hp. 90 per cent of the time. The initial development is estimated to cost $15,000,000.

The proposed use for the power to be developed is said in the application to be for industrial service and commercial power and light for the general market within economical transmission distances, and for the wholesaling of power to municipalities who own or may acquire their own distribution systems.

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PACIFIC GAS AND ELECTRIC COMPANY has appealed to the California Supreme Court to set aside the order of the Shasta County Superior Court which restrained the power company from diverting waters from Hat Creek. The injunction had been obtained by Louis P. Joerger, Hat Creek farmer, who claimed that the waters were riparian to his land and that the power company had no right to divert them. Issuance of the order on Feb. 6 automatically closed the Hat Creek power house. The supreme court has cited Mr. Joerger to appear on April 7 to show cause why the injunction should not be dissolved. In the meantime the power plant will continue to remain inactive.

Merchandising Bill Killed In Nevada Senate

A bill attacking merchandising by public utility companies, passed by the Nevada Assembly last month, was killed by the Senate of that state.

In the bill, exception was made of "such articles, commodities or appliances as may be necessary for use in the conducting of its business as a business utility," and provision was made that "in towns having a population not exceeding 1,500 inhabitants and in communities where the total aggregate of the inhabitants combining all towns and places of abode does not exceed 5,000," the Public Service Commission might grant the right to engage in the merchandising in question for a period not exceeding one year at a time, after which the permit could be renewed for a like period.

The Nevada Merchandising Association sponsored the bill.

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Stone & Webster to Build Long Beach Twelve

The Southern California Edison Company Ltd. has awarded contract covering the design and construction of a 100,000-kw. net operating capacity addition to its Long Beach (Calif.) steam station to Stone & Webster Engineering Corporation, according to George C. Ward, executive vice-president of the Edison company. The work covered by the contract amounts to approximately $7,500,000. It is expected that construction will be completed in 1932. Construction work on the condensing water intake and tunnels already is under way.

With the addition of the new unit, the third of this capacity to be installed in the Long Beach station, the total station capacity will be increased to 515,000 kw. The new unit will be the twelfth installed since the station was begun in 1911. Two units of 100,000 kw. net operating capacity each were installed in the third section of the station June 20, 1928, and Feb. 23, 1930, respectively. The new unit will be a duplicate in all major respects of the last two installed.

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Rate Expert Engaged by California Commission

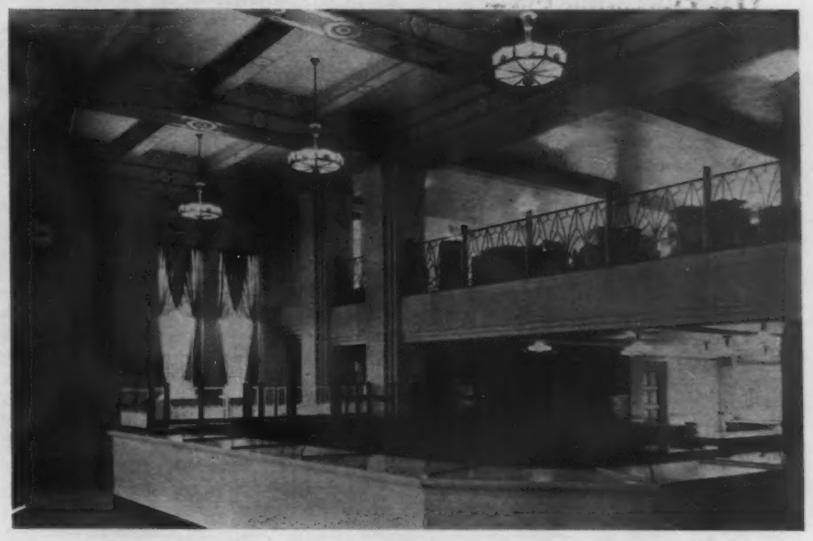
Announcement has been made by the California Railroad Commission of the employment of Walter W. Cooper to take charge generally of the preparation of cases before the commission, the employment to commence as soon as Mr. Cooper can bring to a close his existing engagements with various California cities, by whom he is employed in rate matters.

Mr. Cooper's principal duties will be to maintain a constant check on the rate structures and earning conditions of the various utilities, and to coordinate the work and records of the several departments of the commission in handling rate cases.

Commenting on the appointment, Clyde L. Seavey, president of the commission, said: "The Railroad Commission is greatly pleased in being able to add Mr. Cooper to its staff. He has had a broad and valuable training and experience in representing the public interest in rate matters, before this and other regulatory bodies. We have long felt the serious handicap our department experts were under in being required to build up a rate case, testify in the same, and then act as cross-examiners of utility witnesses. We feel the addition of Mr. Cooper will be a great benefit to our present staff in its work."

Mr. Cooper is a graduate of the University of Minnesota, and has been associated with C. L. Pillsbury, consulting engineer, in connection with the valuation of various public utilities in the District of Columbia for the Utility Commission there, with Dr. Edward W. Bemis in making a valuation of the Peoples Gas, Light & Coke Company for the City of Chicago, and with Dr. Delos F. Wilcox in valuation work on various light and power companies and street railways. He was employed by the East San Francisco Bay cities in the recent telephone rate case, and has represented the cities of Oakland, Sacramento, Stockton, Tracy, Fresno and Minneapolis in utility matters.

New District Office in Los Angeles Suburb



Main business office and public lobby of the Huntington Park (Calif.) district office of the Los Angeles Gas and Electric Corporation, overlooked by the mezzanine, where modern heating, cooking, and water heating appliances are displayed. An auditorium, with demonstration platform and model kitchen, occupies the second floor of this modern, Indiana limestone building. J. C. Guilinger, who has been with the corporation for 27 years, has been made manager of the new office

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Edison Company Places 4,000-Ton Steel Order

Orders for 4,000 tons of structural steel for transmission-line tower construction were placed March 10 by the Southern California Edison Company Ltd. with the Emsco Derrick & Equipment Company, the Pacific Coast Steel Company, and the McClintic-Marshall Company. The orders total approximately $250,000.

Fred B. Lewis, vice-president and assistant general manager of the Edison company, announced that the greater share of the material would be used in the construction of fifteen miles of 220-kv. transmission line between the Lighthipe substation and the projected Stanton substation, and another fifteen miles of sub-transmission line into and out of the latter station. The rest of the steel will be used in construction of shorter lines in other parts of Edison territory in southern California. The Stanton substation will be built on a site two miles west of Anaheim, Orange County, in 1932. Capacity of the station will be 150,000 kva.

Construction of the Lighthipe-Stanton lines will require the erection of 175 steel towers, six to each mile of distance. Towers of the 220-kv. line will be 125 ft. high, and each will require 33,000 lb. of steel. Those of the 66-kv. sub-transmission lines will be 96 ft. high and each will require 40,000 lb. of steel. The 220-kv. towers will be double circuit, and those of the 66-kv. lines will carry six, eight and twelve circuits.

Great Northern Company Has Operating Permit

The Great Northern Power Company has been granted a 50-year franchise by the Washington State Highway Department covering construction, operation and maintenance of electrical transmission and distributing lines on the new Pacific Highway from the city limits of Seattle to the city limits of Everett. Construction will start as soon as the necessary engineering work can be completed. Joseph Irving is president of the company.

Joseph Wickstrom, engineer, estimates the cost of building the transmission line at $186,000 and new plant construction at $1,916,000. The power company expects to be ready to furnish power to the public by December, 1931. Plant A is now in operation on the Olney River with capacity of 1,200 hp. Mr. Wickstrom reports that work has started preliminary to the installation of two 20,000-hp. generator units at this site.

The company will derive its power from the Olney River and both forks of the Wallace River. All the territory it proposes to serve is competitive with that of the Puget Sound Power & Light Company.

Financial

Pacific Lighting Corp. Earns $4.59 Per Share

Pacific Lighting Corporation, of which the Los Angeles Gas and Electric Corporation is a subsidiary, earned a net profit available for dividends on its common stock of $7,157,659.59 in the twelve months ended Dec. 31, 1930, against $6,634,216 in the twelve months ended Dec. 31, 1929.

The balance available for common stock equals $4.59 per share on an average amount of 1,570,515 shares outstanding for the year. This compares with $4.77 a share earned during 1929.

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MIDLAND COUNTIES PUBLIC SERVICE CORPORATION has the California Railroad Commission's authorization to transfer its properties in Fresno, Monterey, San Luis Obispo, and Santa Barbara Counties, Calif., to the San Joaquin Light & Power Corporation by June 30, 1931. On or before that date Midland Counties will abandon all of its operating rights in favor of the San Joaquin corporation. Besides assuming all outstanding bonds and other liabilities of Midland Counties, the San Joaquin corporation is authorized to issue to the acquired corporation $729,000 of common capital stock. These shares will become the property of Pacific Gas and Electric Company, of which the Midland Counties and San Joaquin corporations are subsidiaries.

Edison Co. Earns $3.25 On Common in 1930

Southern California Edison Company, Ltd., after providing dividends on preferred stock, earned $3.25 per share on 2,807,819 shares, the average number of shares of common stock outstanding during the year 1930, as compared with $3.44 per share on 2,537,942 shares in 1929, according to an announcement made last month by John B. Miller, chairman of the company.

Gross earnings for the year ended Dec. 31, 1930, amount to $41,128,734.55 as compared with $40,325,465.21, an increase of $803,269.34 or 2 per cent. The net earnings, after deducting operating expenses and taxes, including provision for income tax, were $28,082,407.32 in 1930 as compared with $27,127,176.82 in the previous year, an increase of $955,230.50 or 4 per cent. After fixed charges, the amount remaining for dividends and depreciation amounted to $21,093,770.80 as against $20,417,020.17, an increase of $676,750.63. After setting aside depreciation, the amount available for stock in 1930 amounted to $16,079,310.57 as compared with $15,483,958.49 in 1929.

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Nevada-California Corp. Profits Increase

The annual earnings statement of the Nevada-California Electric Corporation shows total operating profits in 1930 of $2,968,161.99, in comparison with $2,882,728.85 in 1929; total income for the year just ended is listed at $3,108,444.08 against $3,078,880.24 during the preceding twelve-month period.

Lighting and heating loads were materially increased in 1930, making them the largest in the firm's history. These factors contributed heavily toward a $495,000 increase in revenue.

An item of major importance in the year's business was a contract by Nevada-California to supply the Hoover Dam project, effecting a total sale of 100,000,000 kw.-hr. to the government. Revenue from this contract alone, over the five-year period for which it extends, will approximate $750,000.

One of the company's larger developments in 1930 was the extension of power lines 70 miles into Palo Verde Valley, Calif.

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WUELKER REFLECTOR-LIGHTING CORPORATION STOCK OFFERED—A permit has been obtained from the California State corporation commissioner by the Wuelker Reflector-Lighting Corporation, San Francisco, for the sale of 200,000 shares of 7 per cent common capital stock with a var value of $1 a share. The corporation is capitalized at $1,000,000. It is the intention of the officers to market the stock within the electrical industry. The Wuelker corporation is the manufacturer of the Baby White Kitten line of aluminum reflector lamps for all purposes.

L. A. Gas & Electric Gross Earnings Up

For the twelve months ended Dec. 31, 1930, the Los Angeles Gas and Electric Corporation reports gross earnings of $24,115,777.25, compared with $23,902,-896.79 for a like period a year ago. Operating expenses and taxes during the year increased $802,984.69, resulting in net earnings of $10,756,668.68 as compared with $11,346,773.32 in 1929.

An increase of $477,516.23 in reserves for depreciation and amortization left a balance available for dividends and surplus of $4,767,603.57, compared with $5,832,708.95 for the previous year. This is equivalent to $24.45 per share on the greatest amount of preferred stock outstanding for the period.

After providing for dividends on the preferred stock, there was a balance available for common, all of which is owned by the Pacific Lighting Corporation, of $3,687,699.57.

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BONDS TO FINANCE BOULDER TRANSMISSION LINE—An issue of $2,000,000 of The Nevada-California Electric Corporation's first trust mortgage gold bonds, 30-year 5 per cent series of 1956, has been issued to finance construction of the transmission line which will supply all of the electric power for the Boulder Canyon project. The issue is underwritten by a syndicate headed by Blyth & Company, Inc., and Spencer Trask & Company, and includes The International Company, of Denver; Boettcher-Newton & Company, Denver; and United States National Company, Denver. The bonds are being offered at a price to yield approximately 5½ per cent.

News Shorts

¶ THREE NEW SUBSTATIONS are being built by The Washington Water Power Company (Harrington, 600 kw.; Sprague, 600 kw.; Ritzville, 1,200 kw.). The 24-mile, 110-kv. line from Moscow, Idaho, to Clarkston, Wash., is nearing completion.

¶ THE CALIFORNIA OREGON POWER COMPANY will start construction soon on a $100,000 regulating dam on the Klamath River at Keno, Ore.

¶ ANOTHER OREGON BILL provides for a plant to generate electricity for state buildings in Marion County, now served by Portland General Electric Company.

¶ LYNWOOD, CALIF., has filed a complaint alleging excessive charges for street lighting by Southern California Edison Company Ltd.

¶ NINETY CITIES in the West (California, 67; Oregon, 6; Washington, 4; Arizona, 3; Colorado, Montana, Nevada, New Mexico, 1 each) have adopted legal provisions for welding in building construction in accordance with the Pacific Coast Building Officials Conference Code. Only ten cities in the remainder of the nation have so provided.

¶ WASHINGTON WATER POWER COMPANY must stand trial in a suit for damages brought by Ralph Hansen, Jr., Spokane youth, who was burned rescuing a football at a company power station. A judge denied a company demurrer, declaring a boy cannot be held to the same degree of conduct as an adult.

¶ RESEARCH has been started by Southern California Edison Company Ltd. to determine the effect of fog on various types of insulators. This continued work will be done on 66-kv. lines at El Segunda substation. The station was recently increased from 9,000- to 18,000-kva. capacity.

¶ SAN DIEGO CONSOLIDATED GAS & ELECTRIC COMPANY has purchased property, will build substation on Point Loma, Calif., to better serve near-by residential communities.

¶ NO BIDS came to Elma, Wash., for a new power plant (see ELECTRICAL WEST, March 1, 1931, p. 157), so Puget Sound Power & Light Company reduced rates, got new contract.

¶ LOS ANGELES' BUREAU OF POWER AND LIGHT is under investigation by the Board of Water and Power Commissioners because of reports alleging discriminatory rates given certain electric consumers.

¶ BRITISH COLUMBIA ELECTRIC RAILWAY COMPANY has become radio-wise and uses the air for advertising.

P. C. E. A.

Engineering Section Meets in Fresno

Final reports of committees and discussion of the Engineering Section's participation in the annual P.C.E.A. convention at Del Monte in June were the features of the Fresno meeting of the Engineering Section held March 11-13. Reports on the National Engineering Section meetings held at St. Louis, Mo., were given by R. D. Likely and F. B. Doolittle, the delegates from the Pacific Coast group. At the general luncheon, held at the Hotel Fresno on March 12, W. C. Mullendore, vice-president of the Southern California Edison Company Ltd., addressed the delegates on the subject of "Political Sabotage in Industry." Mr. Mullendore flayed the politicians who use vicious, slanderous, and false statements against private industry to foster political prestige, and he urged the public utilities to wage a vigorous crusade against the spread of this propaganda.

Committee meetings, held at the San Joaquin Light & Power Corporation's building, occupied the three-day convention period. Committee chairmen's reports of these meetings follow:

Accident Prevention Committee

S. C. DICKINSON
Pacific Gas and Electric Company, Chairman

Members of the Accident Prevention Committee met for the most part of two days and discussed subjects of vital importance. Many visitors were present and entered the discussions.

A comprehensive report was made by W. C. Heston, *Electrical World*, Los Angeles, on "Selling Accident Prevention to the Management." From data collected by him from the various utilities with reference to the direct cost of accidents and injuries and the cost of prevention, the committee is able to state that "accident prevention is good business and that it is entirely defensible even from a purely mercenary standpoint." This fact is not universally recognized today, and until it is accepted as a fact, the committee's program is bound to be retarded.

This paper is to be continued over a period of years and eventually will contain data which can be used to prove that the hidden or indirect cost of accidents, is four times as great as compensation and medical payments. Expressed in another way, compensation payments constitute only one-fifth of the total employee accident-cost.

S. G. Olson, Pacific Gas and Electric Company, presented a paper on "Standard Statistics." The committee adopted a form which now is in use by the National Safety Council and the American Gas Association. This form will be used by member companies of the P.C.E.A., who will report annually to the chairman of the accident prevention committee. It is hoped that comparable statistics will prove to be an aid in stimulating interest in accident prevention.

This paper is to be continued and in the end will form a basis for standardization of statistics and causes of accidents and injuries.

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Electrical Apparatus Committee

R. D. LIKELY
San Joaquin Light & Power Corporation, Chairman

Report of the subcommittee on operation and maintenance, J. D. Enefer, chairman, having been made practically in full at the December meeting, it was passed over with a brief comment.

The report of the subcommittee on switchgear, R. B. Kellogg, chairman, reviewed the advantages of metal-clad switching equipment for many purposes. It was reported by the manufacturers that the departments which make this equipment are crowded with work and that sales have increased steadily in the face of a decreasing market on other apparatus during the past two years.

Only one member company of the P.C.E.A. has used any great amount of metal-clad switchgear up to the present time. However, this company has already installed such equipment extensively and has a considerable amount of such work in progress now.

The report of the subcommittee on substation design, C. E. Baugh, chairman, reviewed the general practice of the companies in this geographic section. Among the features emphasized were the tendency to almost eliminate buildings in many stations, the extension of the use of weatherproof equipment to practically all classes of apparatus, the reduction in manually operated stations, and the tendency for power companies to manufacture less and less of their equipment.

Foreign Systems Co-ordination Committee

F. B. DOOLITTLE
Southern California Edison Company Ltd., Chairman

A report on the N.E.L.A. foreign systems co-ordination committee meeting held in St. Louis on Feb. 18-19 was given by the chairman. Attention was called to the fact that the name of the national committee had been changed from "inductive co-ordination committee" to "foreign systems co-ordination committee." Upon recommendation of the P.C.E.A. inductive co-ordination committee, its name was officially changed by action of the Engineering Section executive committee to conform to the name of the corresponding national committee, it now being officially, "foreign systems co-ordination committee, Engineering Section, Pacific Coast Electrical Association."

The subcommittee on inductive co-ordination presented the history of inductive co-ordination and co-operative planning from its beginning in California in 1913 up to and including the symposium on co-ordination of power and telephone plants held at the A.I.E.E. winter convention in New York, Jan. 27, 1931. This paper was discussed by two representatives of the telephone company and two power men, followed by closing remarks by J. E. Macdonald of the Los Angeles joint pole committee, in which he showed that the advanced state of co-operative planning in California was centered around the joint pole activities in this state.

The simplexing of power company telephone lines to provide alarms in attended stations indicating operation of circuit breakers in remote unattended stations was described in detail by the subcommittee on power company communication systems. This commonplace procedure, with ordinary communication circuits, becomes fraught with many difficulties when applied to lines involved in severe exposures. The relia bility of simplex alarm operation is absolutely dependent upon the protective equipment, the details of a successful scheme being given.

Soldering of sleeve splices in telephone conductors to reduce their electrical resistance was also considered by this subcommittee. The new Bell system single-tube sleeves and the sleeve rolling tool for their application were exhibited and described for the committee by M. A. Sawyer of the Southern California Telephone Company.

The subcommittee on common neutral reported progress in field work but little advance in the formation of rules, there still being a question as to how the neutral grid to ground resistance should be specified.

Discussions on current legislation, the California Railroad Commission's report on interference with broadcast reception and a standard form for reporting and summarizing radio complaints, constituted the work of the radio interference subcommittee, after which the General Electric noise meter was exhibited and its operation demonstrated and explained. By the use of this noise meter, the field strength of radio interference may be measured in micro-volts per meter.

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Hydraulic Power Committee

C. M. MARDEL
Pacific Gas and Electric Company, Chairman

Reports of subcommittees on mechanical reliability of hydro-electric plants, flow line conduits, research and practice in hydro development, and special alloys for hydraulic equipment were read and adopted. No report will be made this year by the subcommittee on regulating safety devices.

Talks were given at the meeting by J. S. Yates, Pacific Power & Light Company, Portland, who discussed fishways and electric fish screens; LeRoy Whiting, of M. W. Kellogg Company of New Jersey, describing the manufacture of seamless pipe; and R. J. Neill, of the Haynes Stellite Company, San Francisco, on hard alloys and overlays.

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Meter Committee Meeting

W. A. McMEEKIN
Los Angeles Gas and Electric Corporation, Chairman

Two educational courses for metermen are scheduled for this spring—at the California Institute of Technology, Pasadena, March 23-28, and at the University of California, Berkeley, May 11-16. The committee has tentatively arranged for a relay course at Berkeley in conjunction with the two meter courses.

Laboratory tests were reported on accuracy of reactive kva. metering on unbalanced conditions of load and voltage. Tests showed meters commercially accurate under average voltage conditions.

Special tests and investigations were reported on methods of determining ground resistances, time interval measurements by oscillographs, and the calibration of high-voltage potential transformers using lower voltage transformers as standards.

New developments in demand meters built on an entirely new operating principle were announced; also new type testing switches, two rate meter registers and ground resistance test sets.

Other subjects considered were operation and maintenance of relays, operating problems in meter departments, selection of meter sizes, application of 5-amp. meters to modern lighting installations, meter obsolescence, test facilities, and indicating and recording meters with reference to remote totalizing measurement.

Subjects approved for next year's study include: (1) Education of metermen; (2) special tests and investigations; (3) new developments; (4) operating problems of meter departments, embracing meter obsolescence, demand metering and maintenance, and instrument transformer operation; (5) reactive kva. metering; (6) outdoor secondary metering as applied to California conditions.

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Overhead Systems Committee

J. O. TOBEY

Pacific Gas and Electric Company, Chairman

A resolution was presented and adopted at the meeting which placed the overhead systems committee on record as favoring a revision of certain provisions of General Order 64-A of the California State Railroad Commission pertaining to permissible fiber stresses in wood poles. The Western red cedar pole was particularly referred to as an instance which should be given attention owing to its having a General Order 64-A rating of only 5,000 lb. per square inch as compared with the American Standards Association rating of 5,600 lb. per square inch. Substantiating evidence will be presented to the commission by this committee in order that it may give the subject proper consideration and attention.

A recommendation of the joint committee on simplification of line hardware was submitted, proposing the abandonment of a few items of line hardware and the general use of other items by member companies. Owing to representatives of the various companies affected having been previously informed and familiar with the activities of the joint committee, a motion was presented and adopted to this effect. It is planned to proceed with the simplification of line hardware through the efforts of these committees.

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Prime Movers Committee

C. H. DELANY

Pacific Gas and Electric Company, Chairman

L. J. Kraps, chairman of the subcommittee on review, presented a statement covering various items of interest from minutes of prime movers committees of other geographical sections.

C. E. Steinbeck, chairman of the subcommittee on turbo generators, condensers, and boilers, gave a brief description of the Pacific Gas and Electric Company's new 1,200-lb. pressure steam plant at Station "A," San Francisco, including a description of troubles encountered in starting up the machine. The first unit of this plant had been in operation at a load of 40,000 kw. for several days previous to the meeting.

A brief description of fusion welding of boiler drums was given by D. P. Vail.

Final reports in abstract form were presented by the subcommittees on instruments and automatic control, water conditioning, and operating and maintenance practice. Each of these reports led to full discussions of the various subjects in hand.

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Underground Systems Committee

E. R. STAUFFACHER

Southern California Edison Company Ltd., Chairman

In opening the meeting the chairman called attention to the great amount of information contained in the minutes of the Montreal meeting of the underground systems committee, National Engineering Section, and hurriedly reviewed the two national committee reports, recently prepared, operating temperatures in conduit systems and the present status of experimental cable investigations being conducted in a number of research laboratories throughout the country.

The final report on the subject of leaded vs. non-leaded cable was submitted and discussed, and it was decided to carry on this subject as a part of next year's work. It was further decided to study the subject from a somewhat different angle; that is, instead of confining the study to leaded vs. non-leaded cable, the subject was to be attacked from the angle of the development and use of a low-cost underground system, utilizing non-leaded cable as extensively as practicable where its use will result in a lower cost of installation.

The subcommittee on duct material and pulling stress of cable through various types of ducts submitted its final report. This report contained considerable information covering the characteristics of various forms of duct,—concrete, fiber, soapstone, and soapstone with asbestos, from the standpoint of pulling effort required to pull cables into the conduit and the mechanical strength and heat transmission qualities of the conduit after being installed and in operation. The report indicated that considerable additional information could be obtained on this subject and the committee decided to extend its study for another year.

A final report on progress in the economic application and use of the a.c. network system was submitted in two sections:

First, the economic study preliminary to the installation of an a.c. network system, and second, a short circuit study to determine the magnitude of short circuit currents at various locations on the proposed network system. This report was unique from the standpoint of the careful economic consideration given to the installing of a network system now in process of installation, and showed conclusively that the a.c. network system was the least expensive system to operate and maintain under the conditions to be encountered. There was considerable discussion concerning the probable magnitude of short circuit currents on a network system, and it was brought out that additional information must be accumulated from operating experience before the ratio of the calculated and actual values encountered can be definitely determined.

Experimental investigations made by members of the subcommittee on movement of lead-covered cables due to load heating and operating experience with certain cable modifications which had been applied on one of the systems of the Pacific Coast, were reported on. The necessity of giving serious consideration to this general subject was pointed out.

Manufacture and installation of the three-phase three-conductor 66-kv. cable installed in Cincinnati were described in illustrated talks by manufacturers' representatives. The cable was buried in a trench, no conduit was used, and the motion pictures showed the ruggedness of modern cable quite forcibly.

Illustrated talks by representatives of three leading manufacturers of medium voltage rubber insulated cable pointed out the desirability of ordering cable on the basis of performance specifications, rather than on the basis of detailed chemical constituents of the installation.

A Neon Invitation

THIS huge neon sign on the North Spring St. (Los Angeles) plant of the Stanadard Oil Company of California will for the next eighteen months flash to the world an invitation to attend the Olympic Games in Los Angeles in 1932.

The sign was built by Neale Rainbow Light Corporation and is the largest of its type in the city. The shield at the top is 27 ft. high; the entire display is 66 ft. high by 75 ft. wide. Almost a quarter of a mile of neon tubing in five colors—red, white, blue, green, and gold—was used in its construction. A photo-electric cell, or "electric eye," in combination with an electrical time clock, turns the sign on and off as darkness comes and goes. The time clock is set to close the circuit in the middle of the day, when, of course, the daylight keeps the circuit through the photo-electric cell open. Then as darkness comes on the photo-electric cell closes its circuit, lighting the sign. At midnight, after which there is not enough traffic to justify burning the sign, the time clock is set to turn off the current. At midday the time clock again comes on so that the "electric eye" can put the sign in operation in the evening—and so on through the 24-hour cycle.

Over 3,000 ft. of high-tension cable and ordinary rubber-covered wire, and 1,000 ft. of conduit were required for the electrical work on this display. A separate three-wire circuit and meter were installed to handle the service.

Northwest Association

Interesting Reports Mark Engineering Meeting.

Smaller in numbers but equal in enthusiasm and with the same high quality of material, the Engineering Section of the Northwest Electric Light and Power Association held its eighth annual general meeting at Wenatchee, Wash., March 18-20. The meeting was called to order by E. F. Pearson, Northwestern Electric Company, Portland, chairman of the section, and was welcomed to Wenatchee by Mayor Widby and L. M. Shreve, district manager, Puget Sound Power & Light Company, of that city. L. R. Coffin, district manager of the same company in Seattle, and vice-president for Washington of the association, responded.

As has been customary, each committee took a portion of the program in which to present papers pertinent to its study, after which a general discussion on these papers was had. A resumé of these committee reports and discussions will be given in a later issue.

The second year's progress report on the research in radio interference from

pin type and pedestal type insulators being conducted at Oregon State College by Prof. F. O. McMillan indicated that headway is being made in the design and construction of insulators toward raising the voltage at which radio interference occurs. It was brought out that the solution to the problem would be found through a change in the design of the insulator in addition to a treatment of conducting coating for the distribution of dielectric flux.

Considerable acclaim was accorded Lyman Griswold, consulting engineer, Northwestern Electric Company, for his original research in the attempt to find a relationship between tree rings and climatic cycles. Hydrographic curves produced from the relative width of tree rings, using the average of thirteen trees cut in the Lewis River watershed, indicated that the valley in annual precipitation occurred approximately every 94 years. A comparison of this curve with the rainfall records for Portland for the last 80 years tended to corroborate the conclusion drawn from the tree ring curve.

As a complete surprise to the meeting, W. B. Hampson, a farmer of Omak, Wash., who was present at this session, asked for time to discuss some experiments he had been making during the past few years along similar lines but using different methods. The results of these two experiments carried on independently of each other, proved to be somewhat similar and both researchers agreed that an up-turn in annual precipitation on the Pacific Coast would commence within the next few years.

At one point in the meeting between committee reports, a message from Major H. S. Bennion, director of engineering, N.E.L.A., New York, was read, in which the latest information on airway lighting and marking, radio interference, accident prevention, and code development was told.

Some excellent moving pictures of construction projects lent added interest to the programs of the underground systems, hydraulic power, and overhead systems committees. These portrayed the laying of the 66-kv. submarine cables across the Delaware River from the Deepwater plant to Wilmington; the Chute-a-Caron project of the Aluminum Company of America on the Saguenay River, where an obelisk cofferdam was dynamited into place; and the setting of poles with dynamite in a marsh by the Northwestern Electric Company.

A trip of unusual interest was offered March 21 to the Chelan plant of The Washington Water Power Company north of Wenatchee, and to the Rock Island development of the Washington Electric Company on the Columbia River 13 miles below Wenatchee, now under construction by Stone & Webster Engineering Corporation. The latter being a low head development involving the handling of a large volume of water, presents some features unique in hydro-electric construction in the Northwest.

Commercial Section Committees Present Fertile Reports at Spring Conclave

THE added responsibility of commercial departments in depressed times was the note on which the fifth annual conference of the Commercial Section of the Northwest Electric Light and Power Association opened in Spokane, March 16-17, 1931. This note was sounded by Frank T. Post, president, The Washington Water Power Company, Spokane, who welcomed the meeting to that city, and by P. M. Parry, Utah Power & Light Company, Salt Lake City, who responded. The meeting, slightly less well attended than last year's, was called to order in the Davenport Hotel by George E. Sullivan, Portland General Electric Company, section chairman.

Mr. Post referred briefly to the taxation legislation recently passed by the Legislatures of all the Northwest states where measures were enacted that would have the effect of transferring some of the tax burden from real property to industry by income, excise, and intangibles taxes. It would fall to the lot of the commercial men, he said, to devise ways of selling electric service that would bring in the added revenue necessary to pay these increased taxes. He urged that merchandise load building be set up in such a way as to encourage the co-operation of other merchants selling electrical devices. He further challenged the commercial men to assume their share of the responsibility for educating utility company employees and the public, which, he said, each company should handle in its own territory in its own way. Mr. Parry elaborated some of the points brought out by Mr. Post with particular reference to the obligation of utility companies to their customers and stockholders.

A further preliminary to the meeting was the message from the Pacific Coast Electrical Association brought by Victor H. Hartley, of San Francisco, assistant managing director of that organization. Mr. Hartley outlined the studies being undertaken by the committees of the Commercial Section, P.C.E.A., and explained the organization of the Pacific Coast Electrical Bureau which is set up to put into effect throughout California some of the development programs formulated by P.C.E.A. committees.

The only other subject outside the regular committee reports to be introduced at the meeting was a discussion by F. D. Weber, Oregon Insurance Rating Bureau, Portland, of how the cost of wiring in dwelling occupancies could be decreased without sacrificing adequacy. He urged that utility companies should standardize their requirements for service equipment, panel boards and metering, which would result in permitting equipment to be manufactured in quantity at a saving in manufacturing cost and the labor cost of installing. Discussion of this subject evidenced that considerable interest was taken in it, and the wiring sales committee of the Commercial Section was instructed to work with the North-West Section of the International Association of Electrical Inspectors on the formulation of such standards.

Committee reports and discussion are summarized as follows:

Power Bureau

T. M. GIBBES

Puget Sound Power & Light Company, Chairman

The use of electricity in lumbering operations tending to indicate that central station power was coming to occupy a more favorable competitive position than heretofore was the subject of the report of the power committee, as presented by H. E. Dingle, Puget Sound Power & Light Company. He cited the following five trends which were making it easier to sell more central station power to the lumber industry: (1) The increased utilization of logs reduces lumber waste and thereby cuts down the amount of hog fuel available for the lumber mills' steam plants; (2) increasing power requirements are frequently in excess of existing capacity of lumber mill steam plants; (3) new mills located near the timber are smaller, which tends to increase the relative cost of a mill's own power plant; (4) such mills do not have dry kilns so do not need extra boiler capacity for this operation; (5) such mills have shorter periods of production and thus have a greater annual amortization cost for power plant investment.

The report of the commercial cooking committee by Carl L. Hoffman, The Washington Water Power Company, offered sales helps and advice as to how this load could be secured. The report pointed out that the power company salesman should be a specialist in this line and that co-operation with the manufacturer and jobber of commercial cooking equipment was essential. For advertising it was suggested that a monthly letter to prospects would be the most effective and that space taken in trade journals reaching the restaurant and hotel fields should supplement this direct-mail effort. The desirability of demonstrating equipment to restaurant and hotel managers was also stressed.

The latest information from member companies on heating installations was the main subject of the industrial heating committee reported by Asa K. Gaylord, Northwest Electric Company. The report urged that company heating specialists study oil and gas fired installations of the latest design with a view to figuring whether or not a better electrical installation could be substituted. Discussion brought out that a large total load of this character can be secured in a wide variety of small units and that a survey of each company's territory would reveal the possibility of securing a large number of these small installations. A question as to whether a company selling a small steam boiler for bakery, pressing, and vulcanizing applications should attempt to manufacture such a boiler locally or should recommend the installation of one of the boilers made for such jobs by regular manufacturers in the territory, brought out the fact that companies having had experience with the regular manufactured boilers preferred these to making such boilers in their own shops.

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Lighting Bureau

L. V. ROSS

The Washington Water Power Company, Chairman

Bringing out the trends in industrial lighting which were opening the way for greater loads in this field or opening new avenues of approach, L. B. Gawan, Utah Power & Light Company, chairman of the industrial lighting committee, discussed increasing intensities; the use of ultra-violet light in industry for artificial sunshine; the floodlighting of storage yards and buildings for fire and theft protection; and the use of artificial daylight in factories where color discrimination is important. He suggested a survey of the

market followed by well planned local campaigns. Discussion centered around the kind of sales organization necessary for building this load.

The report of the commercial lighting committee as presented by T. W. Fitch, Portland General Electric Company, chairman, showed some of the demonstrating equipment suitable for use with prospects and for talks to commercial groups, discussed the necessity of giving analytical service to customers, and stressed the need of furnishing lamps of the proper voltage.

He introduced Walter Potter, National Lamp Works, Portland, who demonstrated the effect of under-voltage, showing that the customer paid proportionately more for his lighting and the company sold proportionately less kilowatt-hours when there was even a slight variation between the rated lamp voltage and the voltage at the lamp socket.

The chairman also introduced Clark Baker, Edison Lamp Works, Oakland, who showed how the dead space above windows on store fronts should be changed architecturally so as to allow 9- to 10-ft.-high windows instead of 7-ft. windows to accommodate the heat generated by the higher levels of illumination now demanded in window lighting. Mr. Baker also discussed luminous tube lighting, declaring it was not yet in the field of illumination although it had very valuable uses for certain decorative effects.

In the home lighting field, as reported on by D'Arcy Van Alstyne, Edison Lamp Works, Spokane, chairman of the home lighting committee, it was pointed out that more education in the proper use of lights should be attempted. In quoting the national estimate that 83 per cent of domestic revenue came from lighting, the chairman drew fire from some of those present who insisted that in the Northwest territory generally this percentage would probably not run more than 25 to 27 per cent. It was, however, agreed that the inadequacy of present home lighting in the territory presented a golden opportunity for the sale of more kilowatt-hours and for the improvement of conditions for the customer.

Hobart C. McDaniel, Pacific Power & Light Company, chairman of the electrical advertising committee, discussed the usage and application of different types of signs and floodlighting to stimulate interest in this field. In discussion, the co-operation between the utility companies of Portland and the manufacturers of neon signs for use in the Portland area, whereby the manufacturers now install capacitors on their signs to raise the power factor, was told by J. C. Plankinton, Northwestern Electric Company. He stated that besides increasing the power factor, this action had benefited the manufacturers also since these capacitors made it possible to put more tubing on one transformer.

A report of the outdoor lighting committee, read by the Bureau chairman, discussed load characteristics and possible revenue in street lighting, highway lighting, floodlighting, recreational and sport lighting, and airport lighting.

Summing up the committee reports of the Lighting Bureau, Mr. Ross called attention to the fact that adequacy of wiring was becoming a more and more important problem in the sale of all kinds of lighting.

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Merchandising Bureau

L. W. BRAINARD
Idaho Power Company, Chairman

The subject of water heating proved to be one of the most widely discussed at the meeting, when the report of that committee was presented by H. M. Ferguson, Utah Power & Light Company. The keynote of the report was that a company's set-up should be as simple as possible. It was brought out that all the necessary facts about the characteristics of the load were now known so that any company could formulate its own water heating policy. Particularly stressed was the fact that the water heater should be sold with the range and refrigerator, since the customer was interested in complete electric service and would not object to an increase in his power bill when these three services were added, whereas if water heating alone were added the increase would throw undue emphasis on the cost of water heating. Discussion indicated that all companies are conscious of the value of water heating load and that practically all are set up to promote this utilization aggressively on a basis satisfactory to the customer and the company.

The report of the refrigeration committee by H. W. Cooper, The Washington Water Power Company, chairman, presented the five following conclusions: (1) That refrigeration is a profitable load; (2) that close attention be given to the addition of sales outlets; (3) that improvements be made in the sales presentation; (4) that the profit margin should be widened without too great a sacrifice in quality; (5) that careful attention be given to customer service after the sale.

Following the report of the refrigeration committee, the organization in this territory of the National Electric Refrigeration Bureau was explained by P. M. Parry, representing G. M. Gadsby, president, Utah Power & Light Company, who is Northwest regional director. Mr. Parry called attention to the fact that this activity offered an excellent opportunity to co-operate with other electrical dealers. Reports were heard from the various state chairmen bringing out the status of plans for organizing these states to get the best results from the national promotional effort.

The report of the electric range committee centered around an explanation of different policies adopted in the territory to reduce the sales resistance offered by the cost of wiring. R. B. McElroy, The Washington Water Power Company, chairman, introduced in turn the sales managers of three companies who had taken steps to solve this sales resistance problem. Glenn L. Jackson, sales manager, The California Oregon Power Company, told of the portable wiring unit developed by his company which is now being sold on low monthly payments, and which can be moved readily from one house to another when tenants move. He announced that this company had arranged to capitalize the cost of this portable wiring unit in California.

The plan to secure the co-operation of the owner and the tenant in putting wiring in rented homes at a low monthly cost was told by V. H. Moon, sales manager, Pacific Power & Light Company. This plan contemplates the sale of the wiring to the owner at $1 per month with the agreement of the tenant to pay to the owner an extra 50 cents per month rent.

The free wiring offer during a recent campaign by The Washington Water Power Company was explained by Mr. McElroy, sales manager. (See ELECTRICAL WEST, Oct. 1, 1931, p. 170.) The company felt that results had been commensurate with the cost. General discussion of these plans brought out their good and bad points and also the fact that no one plan could be suggested as the best for every company.

A brief for utility company merchandising constituted the report of the general merchandising committee presented by Glenn L. Jackson, The California Oregon Power Company, chairman. This brief was built up on data covering the companies operating in Oregon. It showed (1) reasons why these companies had felt it necessary to undertake merchandising activities, (2) wherein these merchandising activities had been of benefit to the customers, and (3) wherein the independent dealers had also benefited. Benefits to the customer were shown to have been principally in lowering average cost while the average consumption was being increased. The average annual domestic consumption in Oregon had risen from 714 kw.-hr. in 1926 to 1,130 kw.-hr. in 1930, while the average cost to the customer for the same period had decreased from 4 cents to 3.04 cents.

Supplementing the report, the committee presented for the consideration of all companies, a code of ethics for the employees of the Idaho Power Company, devised by K. M. Robinson, assistant general manager of that company. This code outlined the conduct of employees in their relations with other dealers and was designed to establish an ethical basis on which the company and other dealers operating in that territory might compete.

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General Bureau

Promotional, Rates Committee

R. H. ASHWORTH
Utah Power & Light Company, Chairman

The report of this committee, presented in the absence of the chairman by R. M. Bleak, of the same company, contained load curves for one week of 65 installations with different combinations of appliances in use. Curves showed that the load factor of these installations using light, small appliances, ranges, refrigerators and water heaters, was 44.8 per cent. These curves showed the desirability of the combination rate for lighting and appliance service and indicated the value of these rates in inducing larger utilization.

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Farm Electrification Committee

W. M. HAMILTON
Portland General Electric Company, Chairman

The need for a handbook on rural electrification containing data on use and cost, and detailed information on available equipment for various farm uses of electricity, was brought out in the report of this committee. This handbook or sales manual should be confined to the uses applicable in the Northwest territory and should contain only proved information. It would then be found useful for rural representatives of utility companies and for dealers in farm equipment. Rural representatives of the various companies present all stressed the need for such a handbook, bringing out individual problems and conditions met in the field.

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Wiring Sales Committee

F. H. KERR
Puget Sound Power & Light Company, Chairman

The problem of securing adequate wiring of farm homes and farm buildings was taken up by the wiring sales committee, which pointed out that much of the success of rural electrification programs was dependent on the farmer receiving the proper kind of advice about his wiring at the time the wiring was installed. The report suggested that a pamphlet on wiring should be printed by each company and distributed to its farm prospects prior to the building of extensions. An outline of what this pamphlet should contain, bringing out the different uses that should be provided for in the wiring of the barn and milk house, pump house, poultry house, farm yard, and dwelling house was presented.

90,000 Acre-ft. of Water

RECENT heavy rains in the Puget Sound district have filled the reservoir in the upper Skagit watershed behind the new $4,000,000 Diablo Dam to its capacity. Ninety thousand acre-ft. of water in a lake extending up the Skagit River for a distance of seven miles has been stored up. So great is the volume of water back of the dam that it was necessary to open several of the nineteen Taintor gates, each 18 ft. deep and 20 ft. wide, and capable of releasing 5,000 to 6,000 sec.-ft. of water. Together the gates can furnish escape for 100,000 sec.-ft. of water, which far exceeds the maximum flood record of the Skagit River.

The Diablo Dam is a unit in the Skagit hydro-electric development of the City of Seattle's municipal lighting department.

Meetings

Coming Events

American Institute of Electrical Engineers—Annual Pacific Coast Convention, Lake Tahoe, Calif., Aug. 25-28, 1931.

Arizona Utilities Association—Annual convention at Arizona Biltmore Hotel, Phoenix, April 8-11, 1931.

California Committee on the Relation of Electricity to Agriculture—Meeting in Fresno, Calif., April 8, 1931.

International Association of Electrical Inspectors, Northwest Section—Sixth annual convention at Salem, Ore., Oct. 5-7, 1931.

Southwestern Section—Convention in San Francisco, Sept. 28-30, 1931.

National Electric Light Association—Fifty-fourth convention and exhibition, Atlantic City Auditorium and Convention Hall, Atlantic City, N. J., June 8-12, 1931.

Rocky Mountain Division — Annual convention at Stanley Hotel, Estes Park, Colo., Sept. 2-4, 1931.

National Electrical Wholesalers Association, Pacific Division—Thrice yearly meeting, Hotel Del Monte, Del Monte, Calif., May 7-9, 1931.

Northwest Electric Light and Power Association—Annual convention, Boise, Idaho, June 17-20, 1931.

Accounting Section meeting at Salt Lake City, Utah, April 13-14, 1931.

Pacific Coast Electrical Association—Annual convention at Hotel Del Monte, Del Monte, Calif., June 24-26, 1931.

Commercial Section meeting, Fresno, Calif., April 9-10, 1931.

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G.E. Brings Refrigerator Conventions West

Plans of the General Electric Company's refrigeration department for an intensive 1931 sales campaign were outlined in detail to distributors, dealers, salesmen, and representatives of power company commercial departments at a series of one-day conventions held in Pacific Coast cities during the past month.

Heading a troupe which presented the major points in the company's sales drive by means of dramatic skits was A. C. Meyer, of Cleveland, Ohio, merchandising manager. He was assisted by A. L. Scaife, Howard May, Fielding Chandler, and Frank Corliss from G. E. refrigeration headquarters in Cleveland. The troupe was one of three such groups to tour the United States carrying their own stage settings, props and electrical effects, and covering 52 leading cities.

Economy and health will be emphasized in the company's refrigerator advertising this year, and every model will carry a three-year guarantee. The advertising and sales promotion appropriation for the year is $6,500,000, an increase of a half-million dollars over 1930.

Conventions were staged in the West at Los Angeles; Phoenix, Ariz.; Fresno, Calif.; San Francisco; Portland; Seattle; Salt Lake City; and Butte, Mont.

San Francisco League Has New President

Arthur E. Rowe, president, A. E. Rowe & Company, Inc., was elected president of the San Francisco Electrical Development League last month, succeeding Ernest Ingold; W. A. Cyr, associate editor, ELECTRICAL WEST, has been re-elected secretary-treasurer.

The following three new members were elected to the board of directors:

ARTHUR E. ROWE

Al C. Joy, manager of publicity, Pacific Gas and Electric Company; Harry Thomas, manufacturers' agent; and Edward Martin, Sterling Electric Company, contractor. The three remaining members of the board who will serve for another term are George C. Tenney, editor, ELECTRICAL WEST; Charles Huyck, Graybar Electric Company; and W. R. Marshall, Westinghouse Electric & Manufacturing Company. The new officials were inducted into office at the regular weekly meeting of the league on Monday, March 2, through the medium of a burlesque playlet written by Al C. Joy, entitled "The Crowning of King Arthur."

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Idaho College Gives Farm Electrification Course

A concentrated week of instruction on the economic application of electricity to Idaho farming was offered in "short course" form to rural representatives of power companies and others interested by the Agricultural Experiment Station of the College of Agriculture, University of Idaho, in cooperation with the Committee on the Relation of Electricity to Agriculture of that state during January. The program included one day for inspection of the substation farm of the experiment station at Caldwell, Idaho, and five days of lectures and demonstrations at the headquarters of the university at Moscow. There were 28 registrants.

Features of the visit to the Caldwell substation farm included an explanation of the experimental feeding of lambs with processed forage by R. F. Johnson, assistant animal husbandman, and an inspection of the electrical applications at the Lee Poultry Farm and Hatchery at Middleton, Idaho, near by. The experimental feeding work is described in detail in Experiment Station Bulletin No. 176, "Lamb Feeding Investigation."

The program at Moscow was a full one with sessions each morning, afternoon and evening. One full day was given over to the use of electricity in dairying, and another day to electrical applications for the poultry farm. One session was devoted to home economics, while the remainder of the time was filled in with such general subjects as: Irrigation and reclamation, water supply and pumping plant problems, orchard spraying, apple washing and grading, farm wiring problems and farm motors, and the use of artificial light for stimulating plant growth.

Lecturers were drawn principally from the College of Agriculture and the experiment station staff.

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Oregon Home Economics Course Well Attended

Sixty home-makers and professional women attended the second short course in household equipment conducted by the school of home economics, Oregon State College, Corvallis, Jan. 29-31. Home economics specialists from the world of business and representatives of manufacturers of home electrical equipment joined the college staff in presenting the lecture and demonstration program.

This instructional staff included Eloise Davison, home economics representative, N.E.L.A., New York; Marguerite Butler, Pacific Northwest Public Service Company, Portland; Mildred Knight, The California Oregon Power Company, Medford; Mrs. Fern Hubbard, Edison General Electric Appliance Company, Portland; Edna Richards, Mountain States Power Company, Albany; Jeannette Cramer, home economics editor, *The Morning Oregonian*, Portland; L. C. Rausch, Portland Gas & Coke Company, Portland; D. W. Drucquer, Frigidaire Sales Corporation, Portland; and Walter E. Potter, National Lamp Works, Portland.

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COAST COUNTIES COMPANY ELECTS OFFICERS—At the annual meeting of the Coast Counties Gas & Electric Company, Santa Cruz., Calif., held Feb. 19, the following officers were elected for the ensuing year: President, J. B. Wilson; vice-presidents, R. W. Hanna, E. F. English; secretary and treasurer, R. N. Dreiman; assistant secretaries, B. W. Letcher, H. M. Whitely; assistant treasurers, V. F. Palmer, C. E. Braun, and D. A. McCullough. The board of directors consists of W. H. Berg, Earle Derby, R. N. Dreiman, E. F. English, R. W. Hanna, J. MacPherson, Oscar Sutro, J. H. Tuttle, and J. B. Wilson.

THE ELECTRICAL LEAGUE OF COLORADO will hold its sixth annual statewide conference at the Albany Hotel in Denver on April 22. Six committees have been appointed to prepare the program, handle publicity, and plan entertainment features.

Personals

A. W. Leonard Called to New York by Promotion

ACCORDING to advices received in Seattle from New York, and confirmed at the offices of the Puget Sound Power & Light Company in Seattle, A. W. Leonard, president of that company since 1914, retires on April 1 to assume chairmanship of the board of directors of the parent company, the Engineers Public Service Company. He succeeds C. W. Kellogg, who is retiring, and his headquarters will be in New York City.

Simultaneous with this announcement is the statement that Engineers Public Service Company will on May 1 assume operating management of all its subsidiary properties, formerly operated by the Stone & Webster Service Corporation, including the Puget Sound company.

Mr. Leonard's position in Seattle will be filled by J. F. McLaughlin, vice-president of the Eastern Texas Electric Company and of the Gulf States Utilities Company.

Mr. Leonard has been connected with the Stone & Webster interests for 36 years, more than half of which have been spent in Seattle. He was made president of the Puget Sound company on Nov. 1, 1914, upon the death of Jacob Furth. His work with that company has been outstanding, the company receiving within a period of one year the two highest national honors that can be conferred upon a public utility. On June 6, 1928, the company was named winner of the Charles A. Coffin Medal by the annual convention of the N.E.L.A. at Atlantic City. On June 6, 1929, the Puget Sound Power & Light Company won the Forbes Public Service Cup.

Early affiliations of Mr. Leonard in Maine, where he was born in 1873, include A. S. Porter & Company, and the Edison Illuminating Company, of which he was superintendent and manager at Brockton. In 1901 he went to Houghton, Mich., as superintendent of the Houghton County Electric Company, later becoming manager, and in 1905 he was appointed manager of the Minneapolis General Electric Company, and subsequently vice-president. Following this, he became district manager of the Stone & Webster interests in the Middle West, moving to Seattle in 1912 to join the Puget Sound Power & Light Company.

Mr. Leonard has been extremely active in social and civic affairs in Seattle, occupying positions of great prominence in all charitable movements. Particularly, during the war, he was instrumental in the formation of the Soldiers' and Sailors' Club, and the Army and Navy Club. He has repeatedly served as chairman of the Red Cross drives, with unequaled success.

A. W. LEONARD

LIONEL J. BOURKE

ORR E. CRITES

L. J. Bourke Made Puget Sound District Manager

LIONEL J. BOURKE, for the past five years assistant to W. H. McGrath, vice-president, Puget Sound Power & Light Company, Seattle, was appointed on March 1 to be manager of the southern district of the company at Chehalis, Wash. He succeeds A. M. Chitty, who has been transferred to the Tacoma office of the company as manager of the southwestern district.

Mr. Bourke, who is a native of Texas and a graduate in electrical engineering from Texas Agricultural and Mechanical College, has been with the Stone & Webster organization since 1922 when he entered the statistical department in Boston. He came to Seattle with the Washington Coast Utilities Company in March, 1923, and in February, 1924, was transferred to Elma, Wash., as resident manager. In December, 1924, he returned to Seattle as secretary to Mr. McGrath, later being appointed assistant.

Mr. Bourke is succeeded by L. E. Karrer, who has been appointed secretary to Vice-President McGrath.

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Succeeds G. A. Kumler as Merchandise Manager

ORR E. CRITES, for the last year and a half personnel director of The Laidley Company, Portland, distributor of General Electric refrigerators, joined the organization of the Portland General Electric Company of that city on Feb. 15, 1931, as merchandise manager. In this position he has charge of all the merchandising activities of the company, succeeding G. A. Kumler who has taken charge of the Portland appliance store of the company.

Mr. Crites' experience with the electrical industry dates from 1911 when he joined the Idaho Power Company at Boise as commercial agent, remaining in that position until 1918. In 1920 he went with the Federal Light & Traction Company, Sheridan, Wyo., as sales manager, and in 1922 took a similar position with the Southern Colorado Power Company at Pubelo, Colo., remaining there for four years. In 1926 he became refrigeration manager for the Great Western Stove Company, Kansas City, Mo., and in 1928 joined the General Electric Refrigerator Company, Portland, to be in charge of wholesale sales. When this company was succeded by The Laidley Company in 1930, Mr. Crites was made personnel director.

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Medal Rewards Service of George H. Stockbridge

GEORGE H. STOCKBRIDGE, transmission engineer of the Southern California Edison Company Ltd., has been awarded the John B. Miller distinguished service medal for outstanding accomplishment during his long career with the company. Mr. Miller is chairman of the Edison company, and inaugurated the award in 1928 with its presentation in that year to R. H. Ballard, president of the company.

Notable accomplishments of Mr. Stockbridge, enumerated in a resolution of the executive committee of the company, are: (*a*) The perfection by him of the first 33,000-volt automatic switch; (*b*) his perfection of the first re-closing oil switch; (*c*) the making by him of the first automatic voltage regulator; (*d*) his devising of the method of phasing lines with the use of a string of insulators; (*e*) his invention of the vibration damper used on high-tension lines, which overcomes crystallization of aluminum and copper cables, due to vibration, and thereby effects an enormous saving in the expense of maintenance of this equipment; (*f*) the discovery by him of the principal cause of flashovers on the 220-kv. line, prevention of which has greatly improved Edison service.

Mr. Stockbridge retired from active service on Jan. 1, 1931, after 28 years with the Edison company. He began his career as a lineman and advanced to various positions of responsibility. He became transmission engineer in 1926.

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G. M. GARDNER, merchandising manager of the Vancouver branch of the Canadian Westinghouse Company, has just been appointed a director of the advertising and sales bureau of the Vancouver Board of Trade.

GEORGE H. STOCKBRIDGE

W. H. HOLCOMB

Pelton Water Wheel Co. Promotes W. H. Holcomb

W. H. HOLCOMB, manager of the pump department of the Pelton Water Wheel Company, San Francisco, has been appointed general sales manager with duties embracing sales and distribution of all company products including hydraulic turbines, valves, pumps, and their accessories.

Mr. Holcomb entered the employ of the company in 1919 as sales engineer and was subsequently appointed manager of the pump department. In this capacity he has been particularly active in work of the Pacific Hydraulic Equipment Association and for some time has served as chairman of its northern California division. He is also a member of the San Francisco Engineers' Club.

Prior to his affiliation with the Pelton organization, Mr. Holcomb spent several years in general construction work on the West Coast and in Mexico. He was also engaged as a locomotive fuel efficiency expert with the Southern Pacific Company for a period of four years.

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ARTHUR STRASBURGER, member of the Los Angeles Board of Water and Power Commissioners since October, 1930, was elected president of the board March 12 to succeed Dr. John R. Haynes, who resigned the presidency but who remains as a member of the board. Dr. Haynes, who has been a member of the board since January, 1921, said that he preferred the privileges of the floor to the onerous duties of the chair. He was elected president in September, 1929. Mr. Strasburger has for many years been prominent as a business executive in Los Angeles. At one time he was vice-president of the Broadway Department Store, Inc. More recently he has been president of the *Downtown Shopping News*.

B. A. GETSCHMAN, Bremerton, Wash., has sold his interest in the Pacific Electric Company in that city, and moved to Kent, Wash., where he will become sales manager for the General Motors Corporation.

R. B. MCELROY, formerly assistant sales manager, has been named merchandise sales manager of The Washington Water Power Company, Spokane, according to announcement of J. E. E. Royer, general manager. R. J. Volger, local agent at Omak, has been named district manager at Chelan, succeeding L. V. Harper. L. J. Kerrick, line foreman at Okanogan, has been appointed local agent at Omak.

A. M. FROST, manager of agricultural sales, Pacific Gas and Electric Company, San Francisco, and S. E. Gates, Los Angeles district manager, General Electric Company, have been elected to the board of directors of the Pacific Coast Electrical Bureau. Mr. Frost will serve as chairman of the Bureau's agricultural electrification committee, and Mr. Gates as chairman of the finance committee.

Obituary

Cushman Project Engineer Succumbs to Illness

CULMINATING an illness of less than a month's duration, J. L. Stannard, chief engineer of the Tacoma Department of Public Utilities, died in Glendale, Calif., on March 13. Mr. Stannard has been the genius behind the development of the Cushman power project of the City of Tacoma, of which the second unit is rapidly nearing completion.

After graduating from Cornell University, New York, and before he came to Tacoma in 1923, Mr. Stannard had been employed in important irrigation, water works, and power plant developments all along the Coast, including projects constructed by the Grant Smith Company in California; the Cedar River power plant of the City of Seattle, and the Bull Run water system of Portland. He was consulting engineer for the North Coast Power Company in Portland from 1912 to 1919. Before assuming charge of the Cushman power project, he had been engaged to make private reports on the project. At the time of his death, he was serving his second term as president of the Tacoma Section of the American Society of Civil Engineers, which he had been instrumental in forming, and for which he had obtained the summer session of the national society this year.

Commenting on Mr. Stannard's death, Commissioner of Public Utilities, Ira S. Davisson, said: "His services in the development of the Cushman power project have been worth literally millions of dollars, based upon the improvements in the project plans he was directly responsible for, as well as the economical construction he saw was embodied in the project at all points."

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Retired Edison Company Executive Passes

A. W. CHILDS, 61 years of age, retired executive of the commercial department of the Southern California Edison Company Ltd., died March 14 at his home in Los Angeles after a prolonged period of ill health. He was one of the veterans of the Edison company organization, having joined the company in 1902 as a bookkeeper. He advanced to a number of positions of responsibility and was, successively, district agent in charge of the company's offices in Pasadena, Long Beach, and Redlands. In 1908 he became assistant general agent in the Los Angeles general offices and was made general agent in charge of commercial activities in September, 1928. He retired from active service in June, 1930.

J. L. STANNARD

A. W. CHILDS

Contractor Dealer Inspector

Motor Firm Stages Equipment Show

That executives of industrial establishments are deeply interested in modern electrical apparatus was proved conclusively by the Pacific Electric Motor Company, of Oakland, with its "1931 Electrical Tool and Equipment Show," held March 12, 1931, according to Frank Boyd, president of the company. The show was an entirely invitational affair. Invitations had been sent to executives of all East Bay industrial and commercial establishments and to participating and cooperating manufacturers. A total of 425 guests were entertained during the evening between the hours of 7:30 and midnight, of which only 150 were employees of the General Electric Company, General Electric Supply, and Black & Decker.

At 8 p.m. after everyone had been congregated in the shop to hear the "Amos 'n' Andy" radio program, door prizes were given and Mr. Boyd made a short welcoming address and explained the purpose of the show. During the remainder of the evening the guests circulated among the exhibits and had demonstrated to them the various features of the equipment and tools on display. The complete interest of those present was evidenced by the fact that a large number of those visiting took notes and asked important questions regarding equipment.

"We regard the entire affair as an important indication that there is a great deal of interest in modernization of plants at the present time," said Mr. Boyd. "The kind of questions asked and the interest shown in the new devices, such as the photo-electric cell and control features, indicated to us that the time for modernization has just about arrived and that many industrial plants are planning such work."

Another interesting feature of the show was that visitors kept coming as late as almost midnight, evidently stopping in to see the show on their way home from theaters or other engagements.

The program of the show was one of actual demonstration of equipment. There were working demonstrations in various parts of the showroom and shop. Quite a large area of the shop was devoted to demonstrations of Black & Decker portable electric tools, including new high frequency equipment, high frequency generators, etc., in operation.

Another booth was arranged to demonstrate arc welding equipment and showed the characteristics of all types of welding rods.

Still another exhibit had been arranged to demonstrate the photo-electric cell, with operating relays to show its sensitivity to color differences, its use for counting objects at a faster rate than mechanical devices could, and its ability to detect things invisible to the human eye.

The lighting of the entire building is used as a demonstration of what constitutes good lighting for various types of occupancy. Besides this a corner had been set aside for demonstrating the difference in the illumination produced by under- and over-voltage, various types of diffusing and reflector apparatus, and lighting control.

Besides these there were exhibits of floodlighting apparatus, industrial electric heating equipment, wiring supplies and repair parts, Telechron clocks, Tex-rope drives, electric operators, single-phase motors, enclosed ventilated motors, new horsepower rated switches, various types of switchboards, and exhibits of motor rewinding and repair work.

This company had recently advertised that it had modernized its own plant and this, itself, proved to be a feature of the exhibit. The rearrangement of equipment for greater efficiency, the automatic and special control for all motor-driven equipment, the shop lighting, the equipment at work benches, etc.. all were shown as part of such a modernization plan.

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CONSOLIDATED STEEL CORPORATION'S new Maywood (Calif.) plant has just been wired by Newbery Electric Corporation, Los Angeles. The buildings of the plant cover 28 acres.

PRISON FLOODLIGHTING—Installation of a floodlighting system in the Oakalla prison farm building at New Westminster, B. C., will be carried out by C. C. Carter, of 576 Seymour St., Vancouver, which firm submitted the lowest tender. The announcement of the award of the contract was made by the department of public works recently.

ELECTRICAL MEN of many southern California cities, representing city inspection departments, contractors, power companies, and other industry branches, have been attending meetings on the requirements of the new National Electrical Code and the Electrical Safety Orders of the Industrial Accident Commission. The talks are given by J. M. Evans, electrical engineer with the Board of Fire Underwriters of the Pacific.

THE CITY COUNCIL of Cheyenne, Wyo., granted a special license to A. W. Strand for the wiring of his own house after he had protested the payment of a regular $100 license fee charged against electrical contractors by the city. The special ruling was written into the ordinance to take care of similar emergencies in the future.

OGILVIE ELECTRIC COMPANY is the new name of Santa Monica's (Calif.) former B. and O. Electric Company. Art Ogilvie, Electragist, is the owner.

Attend Trade Practice Conference

Representing Western contractors on the executive committee of the Association of Electragists, International, meeting in Kansas City, Mo., March 18, 1931, were Clyde L. Chamblin, San Francisco, former president of the association, and R. R. Reid, Salt Lake City, representing the Mountain States region.

Both Western representatives to the meeting were accompanied by Louis Kalisher of New York City, following a tour by Mr. Kalisher of the Western states in a series of meetings with motor specialists and contractors. After Mr. Kalisher had held meetings in Los Angeles he joined Mr. Chamblin at Salt Lake City and together with Mr. Reid they went to the Kansas City meeting.

The most important piece of business to be transacted at the Kansas City meeting was a conference with the Federal Trade Commission for the purpose of establishing fair trade practices with the electrical contracting industry. Full announcement of the results of that conference will be made public in subsequent issues.

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NEWBERY ELECTRIC CORPORATION, Los Angeles, has been awarded the contract for electrical work on the new Ford plant in Seattle. This company wired the Ford plant at Long Beach last year.

HASTINGS ELECTRIC SHOP will move this month to new and larger premises at 55 Hastings St., West, Vancouver.

J. H. PARKS, COMPTON (CALIF.) building inspector, acted as chairman of the day at the March 20 meeting of the Southern California Chapter, I.A.E.I., in Huntington Park. Besides reports and discussions on grounding, the program included an inspection of a new theater.

DAVIS ELECTRIC COMPANY, Ontario, Calif., has moved into a new store offering five times the former display space as well as warehousing accommodations and garages for a fleet of cars.

C. A. SANBORN & COMPANY, LTD., and Newbery Electric Company, through the courtesy of the owners of the new Los Angeles Theater, were hosts to a number of electrical people at a demonstration of the new Westinghouse thermionic-controlled theater-dimming switchboard in that theater on Feb. 7.

RADELFINGER BROTHERS, Electragists of San Francisco, have just completed and moved into a new building at 544 Natoma St.

THE BAKER AVENUE ELECTRIC COMPANY, 4472 Baker Ave., Bell, Calif., operated by James W. Stratton, radio and electrical dealer, has opened a branch store at 8477 State St., South Gate, Calif., which operates under the name of State Street Radio Shop.

Manufacturer Distributor

Robeson-Rochester Corp. In San Francisco

Expansion of its business on the Pacific Coast was responsible for the opening of a warehouse and offices in San Francisco last month by the Robeson-Rochester Corporation, of Rochester, N. Y., manufacturer of Royal Rochester metal ware. Occupying the major portion of a new building at 267 Ninth St., the new quarters house complete stocks of the corporation's electric

P. B. MILLER

appliances and galvanized hardware. P. B. Miller is Pacific Coast manager, and his headquarters have been moved from the former Oakland warehouse to the new San Francisco building.

C. E. Louis has been appointed a direct factory representative in the southern California territory, with headquarters in Los Angeles. Distributors of Royal Rochester products in California are: Listenwalter & Gough, Inc., San Francisco and Los Angeles; The Heyman Company, Inc., San Francisco; and Hoffman Hardware Company and California Wholesale Electric Company, both of Los Angeles.

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Cinderella Washer Distributors Named

A Pacific Coast distributing organization for the Cinderella portable washer has been established by W. C. Allen, sales manager of the Black & Decker Manufacturing Company, Towson, Md., who recently spent some time on the Pacific Coast for that purpose.

Ernest Ingold, Inc., of San Francisco, Pacific Coast distributor of Atwater Kent radios, will have charge of northern California sales of the washer; Pacific Wholesale, Ltd., Los Angeles, is southern California distributor; and Majestic Distributing Company, Seattle, with branches in Portland and Spokane, is distributor in the Pacific Northwest. No distributor has so far been appointed in the Intermountain territory.

B. M. Williams, who during the past ten years has sold Maytag, Meadows, and Easy washers on the Pacific Coast, has been appointed direct factory representative in this territory of the household division of Black & Decker. Mr. Williams' headquarters will be at the company's warehouse in Oakland, Calif. Other items of household electrical merchandise will be added to the Black & Decker line during the next few months.

Jack Lanzman, who has been with the Graybar Electric Company in the San Joaquin Valley territory for the past twelve years, has joined Ernest Ingold, Inc., and will be engaged in sales promotion work on the Cinderella washer.

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G. E. LAMP DEPARTMENTS MERGED—The Edison Administration Department and the Edison Sales Department of the Edison Lamp Works have been merged into one department, to be known as the Edison Administration Department. Departments of the National Lamp Works formerly known as the National Administration Department and the National Sales Department have been merged into one department to be known as the National Administration Department.

Apex Electrical Mfg. Co. Buys Wayne Refrigerator

The Apex Electrical Manufacturing Company, of Cleveland, Ohio, has purchased the electrical refrigeration business of The Wayne Home Equipment Company, of Fort Wayne, Ind.

Early last September it was announced that Apex would enter the electric refrigeration field, creating a new division to handle the business, but recent development of a new line of washers, ironers and cleaners having taxed production at the six Apex factories in Cleveland and the Oakland, Calif., plant to capacity, it was deemed advisable to purchase the Wayne refrigerator business outright, and to continue production in the present plant at Fort Wayne.

The entire dealer organization of the Wayne company will remain intact and continue to be supplied with refrigerators built at the Fort Wayne plant, according to C. G. Frantz, president of the Apex company. Production, however, will be materially increased, he stated.

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FARNHAM & CUNNINGHAM, Los Angeles, have moved their electrical engineering and sales offices into the new Southern California Edison Company Building at 601 West Fifth St.

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At Cleveland G. E. Refrigerator Convention

FIVE representatives of General Electric refrigerator distributing organizations and a utility merchandising manager from the Pacific Coast attended the recent fourth annual national convention of the G. E. refrigeration department in Cleveland, Ohio. Left to right are: H. H. Courtright, president and manager, Valley Electrical Supply Company, Fresno, Calif.; F. M. Rowles, sales manager, The L. H. Bennett Company, Ltd., San Francisco; Roy Bennett, president of the same company; Harold Laidley, president, Laidley Company, Portland and Spokane; George Belsey, president, George Belsey Company, Ltd., Los Angeles; and George T. Bauder, president, George T. Bauder Company, San Diego, Calif.

With an advertising and sales promotion appropriation of $6,500,000 for 1931—a half million dollars more than in 1930—the convention launched a sales drive on G. E. refrigerators which is expected to break all previous records. Prices of all models are lower, and a three-year guarantee supersedes the "No one has spent a cent for repairs" slogan. Fifty-two sectional conventions are now in progress throughout the United States.

Frigidaire Launches 1931 Campaign

Frigidaire dealers and salesmen throughout the United States and Canada during 1931 will be aided by a $7,000,000 advertising and sales promotion program, the largest ever appropriated by this corporation.

Simultaneous with the launching of its intensive drive for sales, Frigidaire Corporation is announcing its 1931 line of household electric refrigerators. These will be featured in the advertising as "Advanced Refrigeration." The advertising states that a number of refinements and improvements have been made, and that the 1931 household models are finished inside and out in white porcelain-on-steel, offer lower operating cost, more shelf space, faster freezing, more ice cube capacity and more surplus power for mid-summer weather. In addition, a three-year guarantee covering both cabinet and mechanism accompanies all of the new models.

Besides the quality appeal of the new product, dealers and salesmen will use a thrift and economy appeal in their campaign for business. Reports from users, showing that many of these electric refrigerators have been paid for with savings they made possible, will be part of the field organization's selling equipment.

A series of dealer meetings throughout the country has recently been completed, at which the new line of refrigerators was presented and the corporation's advertising and sales promotion program discussed.

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STEEL TOWER BIDS—Bids for construction of the steel towers for the Diablo-Seattle power line will be called soon. It is expected that this work will cost $1,700,000. Contract for the superstructure of the Diablo power house remains to be awarded, and it is estimated this work will cost between $500,000 and $750,000. Contract for the foundations for this structure is held by Ward Construction Company, of Tacoma, at $279,847.

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PACIFIC ELECTRIC MANUFACTURING CORPORATION on April 1 again established a representative in Portland after some months during which Charles H. Cutter, district manager at Seattle, handled the company's business in both territories. Urban N. Halliday, who since September, 1929, has represented the company in Phoenix, Ariz., was appointed to the Portland post. Mr. Halliday represented the company in Portland prior to his sojourn in Phoenix and is thoroughly familiar with the Northwest generally and its needs.

ILLINOIS TESTING LABORATORIES, INC., 141 W. Austin Ave., Chicago, has announced through its sales manager, M. D. Pugh, the appointment of James H. Knapp Company, 4920 Loma Vista Ave., Los Angeles, with a branch in San Francisco, as exclusive Pacific Coast distributor of its products, consisting of portable and stationary indicating pyrometers, resistance thermometers, and other electrical and magnetic measuring instruments.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY has been given a contract for furnishing three 200-hp. synchronous motors and twelve other motors, ranging from 15 hp. down, for the White River Lumber Company at Enumclaw, Wash.

G. E. SELLS OUT TROLLEY MATERIALS LINE—The General Electric Company, Schenectady, N. Y., has disposed of its trolley line material business to the Ohio Brass Company, of Mansfield, Ohio. The line includes overhead materials for electric railways, electrified mines, industrial haulage, and electrified steam roads. This is a field in which the Ohio Brass Company has specialized quite intensively for many years.

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TO SELL FRIGIDAIRE IN SALT LAKE CITY—Walter F. Ford, former zone manager for Buick Motor Company in Salt Lake City, has taken over the retail dealership for Frigidaire and General Motors radio in that city. He will operate under the name of Walter F. Ford, Inc., at 15 East First South St. He succeeds to the business formerly operated by the Frigidaire Sales Company. Twenty-five people are employed in the office, sales and service departments of the Salt Lake City branch of the Frigidaire organization.

ERNEST INGOLD, INC., of San Francisco, has been appointed northern California and Nevada distributor of the household electric refrigerators made by the Holbrook Manufacturing Company, Los Angeles. These include eight models ranging in price from $154.50 to $595.

THOMAS PLIMLEY LIMITED, automobile dealer of Victoria, B. C., has been appointed Vancouver Island distributor for Frigidaire and Delco Light products. L. C. Beach, formerly manager for Bruce Robinson Electric Company, Victoria, will act as sales manager for these lines.

DISTRIBUTORS OF ALTORFER BROS.' PRODUCTS — Intermountain Majestic Company, Denver, and the Gurr-Smith Company, San Bernardino, Calif., have been added by Altofer Bros. Company, Peoria, Ill., to its distributors in the Western states of ABC washers and ironers and the Electro-table.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION will hold its spring meeting at The Homestead, Hot Springs, Va., May 18-23.

UTILITIES EQUIPMENT CORPORATION, LTD., 110 North Alameda St., Los Angeles, has been appointed representative for the Electro Engineering Company, New York City, in the states of Washington, Oregon, California, Arizona, Nevada, Idaho, and Utah. This company manufactures the Electro Melter for melting lead, solder, and Babbitt metals, and compound pots for heating paraffin, wax, and compounds.

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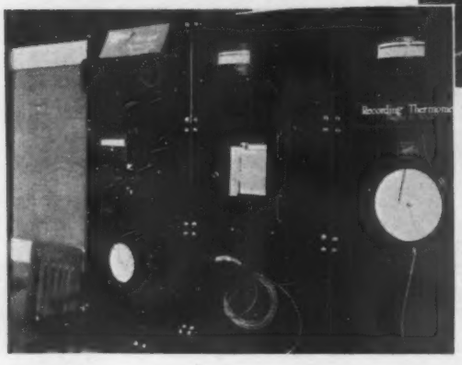
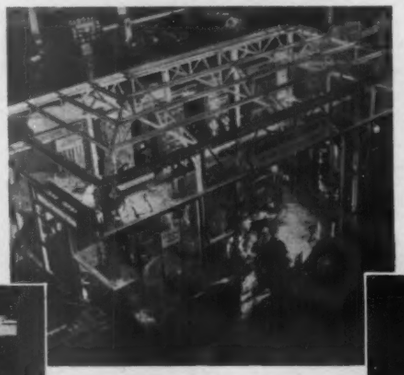
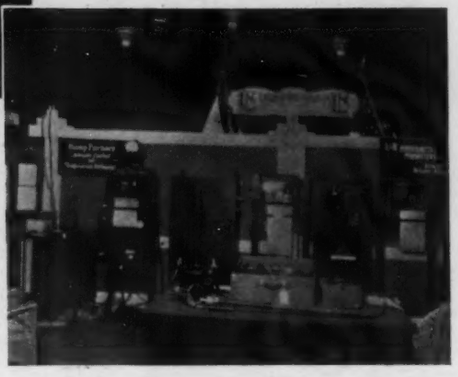
Western Metal Congress





San Francisco Exposition



Interesting among the displays by manufacturers at the recent Western Metal Congress in San Francisco was (top) the all-electrically-welded steel frame housing the exhibit of Roberts Welding Equipment Company, San Francisco. Left, The Bristol Company featured this large composite board. Right, Leeds & Northrup's display of small instruments and boards

New Products

Modernistic and Oscillating Art Fans

An 8-in. fan in modernistic design has been added by Robbins & Myers to its line of desk, ceiling, and ventilating fans. The fan's smartly flared guard and beveled base, with a shaded silver-like finish, provide a design to harmonize with present-day furnishings. Mounted on the front of the fan between the motor and blades, the fan's oscillating mechanism is well concealed and protected from contact with curtains or draperies. The fan is built in 25- and 60-cycle, 110-volt, a.c. types with list prices of $12.75, and $14.25 respectively.

Robbins & Myers, Inc., has also just announced a new 10-in. oscillating art fan in a.c. and d.c. models. This fan, with its handsome silver-like finish and graceful modern lines is especially designed to harmonize with today's home and office furnishings.

Rigid construction throughout increases the life of the fan and provides an unusual amount of blade protection. Dependable performance is insured by an efficient lubricating system. A single speed toggle switch mounted in the base furnishes operating control.

The 110-volt, 60-cycle and 25-cycle a.c. fans are of the induction type and list at $18.95 and $20.45 respectively; the 110-volt d.c. fan also lists at $20.45.—ELECTRICAL WEST, April 1, 1931.

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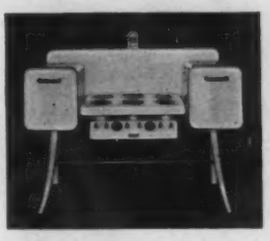
EQUIPMENT FOR DOMESTIC OIL BURNERS—The General Electric Company announces a complete line of electric equipment for domestic oil burners, thus making it possible for the burner builder to obtain a coordinated line of electric equipment of one manufacture. The line includes motors, control, and ignition equipment.—ELECTRICAL WEST, April 1, 1931.

Two-Oven Electrochef

A two-oven Electrochef, known as the Master Model, is announced by Electromaster Inc., of Detroit, for sale to extra large families and for the heavier requirements of restaurants and tearooms.

Each oven is separately and automatically controlled by an optional timer. There are six heating units on the cooking table, each with three-heat speeds. All heating elements are identical with those in the company's standard model "B."

The Master Model is finished in chromeplate and porcelain enamel, and is available in two colors, green and white. The entire range is only 68 in. in width, and will satisfactorily fill the cooking requirements of a family of 15 persons, according to the manufacturer.—ELECTRICAL WEST, April 1, 1931.



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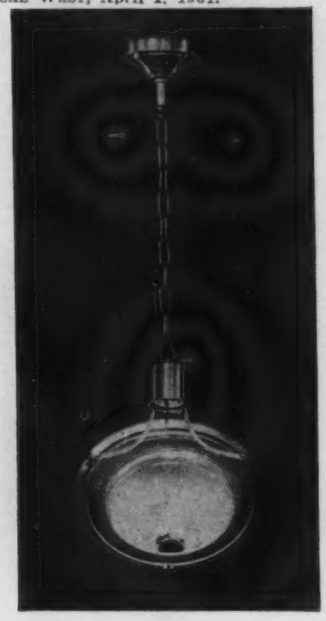
Indirect Luminaire

Pittsburgh Reflector Company, Pittsburgh, Pa., announces an indirect luminaire in three sizes for commercial service. An unusually broad and uniform distribution of light over the ceiling is given by these reflectors, a single central unit with 30-in. suspension, adequately covering an 18-ft. bay.

Bowls of the reflectors are of spun copper, suspended from spun copper husks enclosing the sockets by means of detachable steel arms. The canopy is of spun copper, stem of brass tubing, chain of steel, with all external parts finished in dark statuary bronze. Interior of the reflector (dropped in the illustration for cleaning or re-lamping) is of smooth glass.—ELECTRICAL WEST, April 1, 1931.



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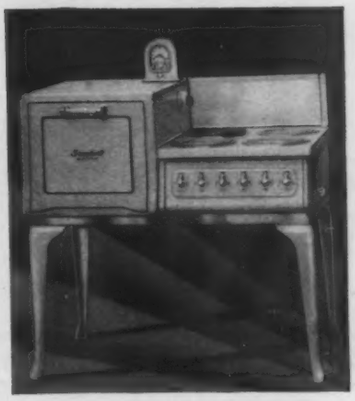
375-WATT MOVIE PROJECTOR LAMP—Said to achieve a light intensity more than 40 per cent greater than was previously available for this type of projection, a 75-volt, 375-watt lamp for 16-mm. movie projection has been perfected by Bell & Howell Company, Chicago.—ELECTRICAL WEST, April 1, 1931.



New Electric Ranges

Four new models of Standard electric ranges, supplementing the four models now in the line, have been introduced by The Standard Electric Stove Company, Toledo, Ohio. All have concealed hinges and bolts, streamline construction, new type plug-in switches, reciprocating and load balancing switches, aluminum lined ovens, appliance receptacles, and complete time and temperature control. Two models have 16 x 14 x 18-in. ovens, the two other models 14 x14 x 18-in. ovens, with four and three hotplates respectively. Retail prices range from $183 to $201.—ELECTRICAL WEST, April 1, 1931.

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Automatic Washer

Distinctive in appearance is a new model 31 "Champion" washer of the Automatic Washer Company, Newton, Iowa, made to retail at $79.50. It is of the conventional bottom-drive, agitator type, with three-vane cast aluminum agitator operated by a worm and segment gear drive. All mechanism is supported in one-half of a heavy one-piece cast iron gear case. Power transmission is enclosed, runs in oil, and is sufficient for the life of the washer. Use of a segment and pinion made of laminated steel parts, Westinghouse motor with direct drive, rubber mountings and steel motor support reduce noise and vibration to a minimum, the manufacturer states.

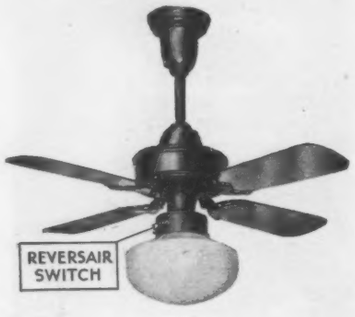
The tub, of black porcelain outside over "Armco" ingot iron, and mottled green inside, is of 15-gal. capacity. Lid, wringer, and washer base are finished in white enamel. A trough-type wringer with 2¼-in. balloon rolls returns water to the tub through a swinging spout.—ELECTRICAL WEST, April 1, 1931.

Portable and Ceiling Fans

The Century Electric Company, of St. Louis, Mo., has added two new units to its line of portable and ceiling ventilating fans.

The Century "Reversair" 36- and 60-in. a.c. ceiling fans are electrically arranged for reversing the direction of the rotation of the fan, and, accordingly, the direction of the movement of the air, permitting either upward or downward air delivery. No mechanically moving parts are required to reverse the air movement, but instead a switch is located on the fan or on the wall.

An 8-in., 1-speed stationary fan for alternating current has a fully-enclosed, pressed steel frame, induction type motor, pressed steel stand, steel wire guard, steel blades, phosphor bronze bearings, and a switch in the base. It is finished in lustrous black. A wool-yarn system of lubrication is used, which makes it necessary to oil the fan only once each season. This fan can easily be arranged for side wall mounting—ELECTRICAL WEST, April 1, 1931.



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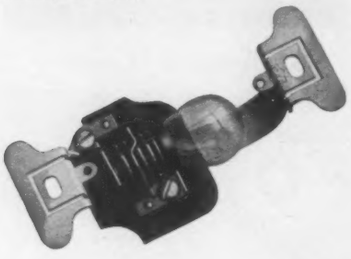
Warning Light Receptacle

Small, compact and easily wired is a new warning light receptacle (catalog 7905) announced by Cutler-Hammer, Inc., Milwaukee, Wis. The body of this device is made of tough, molded Thermoplax, with a heavy, one-piece, cadmium plated steel mounting bracket.



A 2-c.p., 125-volt, intermediate base lamp is easily inserted in the receptacle, and a heavy brass spring clip holds the lamp securely so it will not work loose from vibration. Contacts are integral with the terminals—made of one-piece heavy brass, with large staked terminal screws for easy wiring. The terminals are marked for polarity. Mounting holes are standard box and plate spacings.—ELECTRICAL WEST, April 1, 1931.

Improved Hand-cleaner

Announcement has been made by The Premier Vacuum Cleaner Company, Cleveland, Ohio, of an improved hand-cleaner, the Premier Spic-Span model 97, replacing model 86.

The nozzle of this cleaner has been lengthened and redesigned to get into corners and crevices with greater facility. A more powerful motor and larger fan are used in the new model, resulting in greatly increased suction. Other improvements are a die cast nozzle and fan chamber instead of sand cast, providing a smoother inside finish, and a durable rubber bumper which completely encircles the nozzle and prevents scratching and marring of highly polished furniture and woodwork.

The improved model will continue to be sold either separately or with a Premier Junior or Premier Duplex floor model in place of attachments. Retail price of model 97, with deodorizer and blower accessories, $15.50.—ELECTRICAL WEST, April 1, 1931.

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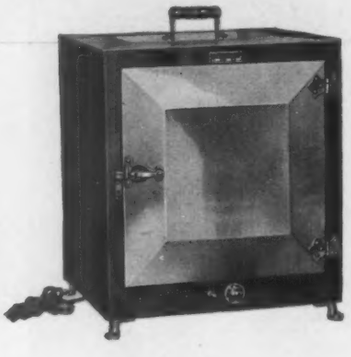
Electric Plate Warmer

A new, portable plate warmer with capacity for two dozen dinner plates and room for other dishes has just been placed on the market by the Hewitt Electric & Manufacturing Company, 1169 Massachusetts Ave., Arlington, Mass.

Over-all dimensions of this type No. 300 plate warmer are 18 x 12½ x 23 in. It has two shelves and a double-wall stainless steel door; finish other than door is black duco on non-rusting steel.

The device is intended particularly for the better-class homes, especially where electric ranges are installed, and to meet hotel requirements for portable plate-warmers to be used for serving hot meals in rooms. It is rated at 440 watts, single heat. Retail price, $50.—ELECTRICAL WEST, April 1, 1931.



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TRAFFIC CONTROL TIMER—A new type of traffic control timer, incorporating all the flexibilities of the different preceding types, has been introduced by the General Electric Company. Of universal application, the new timer can be used at isolated intersections, for limited progressive traffic movement, non-interconnected, and for flexible progressive traffic movement in an interconnected system.—ELECTRICAL WEST, April 1, 1931.

Holophane "Realite"

Holophane Company, Inc., New York, has introduced a totally indirect, ornamental and dust resisting unit designated as the "Realite." All visible parts of the unit are made of dull-finish aluminum. The fixture is supplied with extension hickey, drop canopy, swivel joint, stem suspension, with wire included but not attached to terminals. It is easily lamped from the bottom by unscrewing the knob.

Controlled light distribution is produced by a two-piece prismatic refractor, smooth on the outside, held against gaskets between the cast bottom flange and upper socket cover, and concealed by an aluminum mask and baffle.—ELECTRICAL WEST, April 1, 1931.

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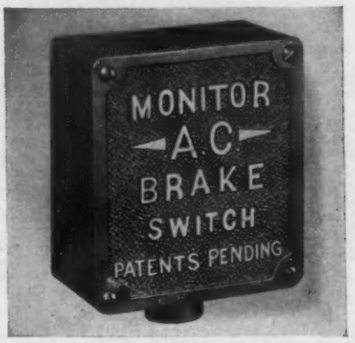

A. C. Slip Switch

A recent piece of control equipment introduced by the Monitor Controller Company, of Baltimore, Md., is the Monitor slip switch for braking a.c. motors.

This switch is designed for use with a.c. controllers where reverse-torque or plug-reverse breaking is employed and where motors coming to rest can be allowed to start in the reverse direction before being disconnected from the line. The slip switch is attached to the motor end bell and operated by direct connection to the end of the motor shaft. The contact switch is operated by an arm connected to a friction ring mounted on an extension of the motor shaft. The friction exerts enough pressure to hold the contacts closed. Motion in the opposite direction opens the contacts. By this construction the motor is disconnected the moment it comes to rest and starts to reverse. The switch is completely enclosed and arranged for rigid or flexible conduit connection.—ELECTRICAL WEST, April 1, 1931.

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ANOTHER THREE-YEAR GUARANTEE—Columbia Electric Manufacturing Company, Cleveland, Ohio, has announced that in future the brushes on their new-type generators will be guaranteed to last three years. Brushes are adjusted at the factory and locked in position; no adjustment is necessary to eliminate sparking, and commutation is claimed to be perfect from no load to extreme over-loads.

Nepcoduct Divinator

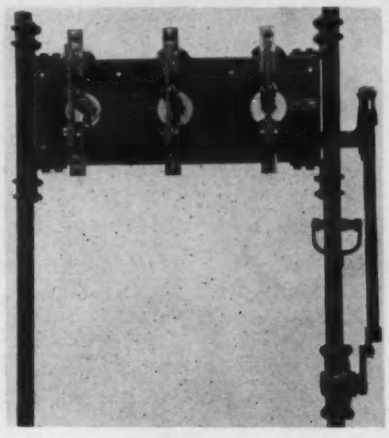
Ducts and outlets under the floor surface can be speedily and accurately located by the Nepcoduct Divinator, manufactured by National Electric Products Corporation, Pittsburgh. The Divinator is employed where existing outlets are hidden by linoleum or other floor covering, or buried in concrete. It is simple in operation—anyone can use it as the ear readily recognizes the characteristic sounds made by the mechanism as the instrument is carried along the floor. When the Divinator crosses steel underfloor duct, a definite sound is transmitted to the headset, and when the instrument is over an outlet, another definite sound is made.

Use of the Divinator eliminates the necessity of keeping large files of record blueprints or floor layouts.—ELECTRICAL WEST, April 1, 1931.

Switching Unit

A new self-contained, gang-operated switching unit for mounting on pipe frame work is announced by the Delta-Star Electric Company, Chicago. A steel base carries on the back the complete interlocking operating mechanism, controlled by a handle which can be located at any desired height from the floor, and is drilled for mounting barriers which can be easily installed.

Each unit is shipped assembled and ready for installation. The switch is made for a wide range of voltage and ampere capacities.—ELECTRICAL WEST, April 1, 1931.



Welding Electrode

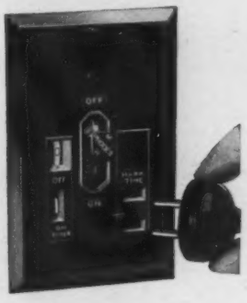
A heavily coated electrode for quality welding is announced by the General Electric Company. Designated as type R, this particular type of electrode is composed of 0.13 to 0.18 carbon steel covered with a heavy coating of cotton braid impregnated with an arc stabilizing flux, and is available in diameters from ⅛ to ⅝ in. by 18-in. length.—ELECTRICAL WEST, April 1, 1931.

"Mark-Time" Switch

An electric light switch containing a time element which automatically turns off the current after any predetermined time is being manufactured by M. H. Rhodes, Inc., New Haven, Conn. The time element is operated by throwing the toggle the desired number of times. Each throw of the toggle is shown as an interval on the dial. The interval may be seconds, minutes or hours, depending upon the particular model of switch.

By setting the small side lever to "off" position, the switch can be operated as a regular switch, as the timing mechanism has been discontinued, cutting off the current. This lever can also be used to cut off current immediately, although the timing element may be operated. Ordinarily the switch is for breaking contact only, but the movement may be reversed by changing wire connections.

Mark-Time switches are made in three models—with second, minute, or hour intervals—and may be used for controlling residential, factory, school, and store window lights, signs, or for household appliances. Type A (above) is a single-pole model without receptacle; type B (below) also a single-pole model, has built-in series receptacle.—ELECTRICAL WEST, April 1, 1931.



Trade Literature

¶ LIGHTING PANELS—A recent booklet of the Bull Dog Electric Products Company, Detroit, is devoted to a new type of lighting panelboard developed by that company, known as the "Superba."

¶ EMERGENCY ELECTRIC SERVICE—The adaptability of the Kohler electric plant for a variety of emergency installations is described in a folder entitled "Protection Against Light Failures," recently issued by Kohler Company, Kohler, Wis.

¶ LIGHTING REFLECTORS—New designs of Permaflector industrial lighting reflectors, floodlights, and underwater projectors are announced in a series of catalog additions recently published by the Pittsburgh Reflector Company, 304 Ross St., Pittsburgh, Pa.

¶ VULCANIZED FIBER TUBES AND RODS—Standard dimensions, tolerances and specifications for vulcanized fiber sheets, tubes, rods, and rolls are given in a revised pamphlet just issued by the National Electrical Manufacturers Association, New York. The pamphlet contains several new rules on tolerances for diameters of vulcanized fiber tubing and rods, standard length of sheets, and minimum dielectric strength for thin-weight, fiber, and fish paper.

¶ INSULATOR CATALOG—Catalog No. 30 of The R. Thomas & Sons Company, Lisbon, Ohio, presents in book format the complete line of porcelain insulators manufactured by this company. Full operating data covering the use of these insulators for all conditions are included.

¶ WIRING DEVICES—The complete line of wiring devices manufactured by Harvey Hubbell, Inc., Bridgeport, Conn., is listed and described in the company's catalog No. 20, recently issued.

¶ ELECTRIC FLASHER—The Reco CMO flasher for electric signs, displays, signaling, and special control work is the subject of bulletin No. 49 of the Reynolds Electric Company, Chicago.

¶ BELT DRIVES—Specifications and prices of standard short-center flat-belt drives, 1 to 50 hp., manufactured by The Rockwood Manufacturing Company, Indianapolis, Ind., are given in a catalog issued recently by that company.

¶ ELECTRIFYING THE FARM—Under this title, the Crouse-Hinds Company, Syracuse, N. Y., has published bulletin No. 2227 describing the use of condulets in the wiring of farm buildings and of floodlights for various farm operations.

¶ ARC WELDING—Descriptions and prices of electrodes, shields, rods, holders, cables, clothing autogenizers and other arc welding accessories are given in section No. 3304 just issued as an addition to the arc welding catalog of The Lincoln Electric Company, Cleveland, Ohio.

¶ SLIP RING MOTORS—Slip ring motors are the subject of an eight-page bulletin recently issued by the Wagner Electric Corporation, 6400 Plymouth Ave., St. Louis, Mo. The four different types of these motors are discussed.

¶ SWITCHBOARDS AND PANELBOARDS—"Squares and Diamonds" is a booklet being issued monthly by the Diamond Electrical Manufacturing Company, 868 Bendix Bldg., Los Angeles. Switchboards, panelboards, and motor control apparatus handled by the company in the eleven Western states are described.

¶ SAFETY LIMIT STOPS—Bulletin No. 1035-F of The Electric Controller & Manufacturing Company, Cleveland, Ohio, describes that company's Youngstown safety limit stop for use on a.c. and d.c. cranes. Illustrations show how it is applied to different types of both new and old cranes.

¶ DIESEL ENGINES—Verticle, 4-cycle, direct-injection, Type B Diesel engines designed for continuous, economical performance covering the 50 to 150-hp. range, are the subject of bulletin S-500-B5 of the Worthington Pump & Machinery Corporation, Harrison, N. J.

¶ INDICATING AND RECORDING INSTRUMENTS—CO_2 meters for indicating and recording the percentage of carbon dioxide present in flue gases of furnaces are described in catalog No. 3004 recently issued by The Brown Instrument Company, Philadelphia.

¶ G. E. PUBLICATIONS—Recent publications of the General Electric Company, Schenectady, N. Y., include the following:

GEA-1351: G.E. Automatic Tank and Pipe Welder.
GEA-703A: Station Oil Circuit Breakers.
GEA-782C: Outdoor Switch Houses.
GEA-1128A: Steel-Panel Switchboards.
GEA-1135A: Rectangular Switchboard Instruments.
GEA-1239: Miniature Instruments.
GEA-970B: Type PQ Relays.
GEA-1259A: The Modern Trolley Bus.
GEA-1337: Small Synchronous Condensers.
GEA-820A: Vertical Waterwheel-Driven Generators.

Barometer

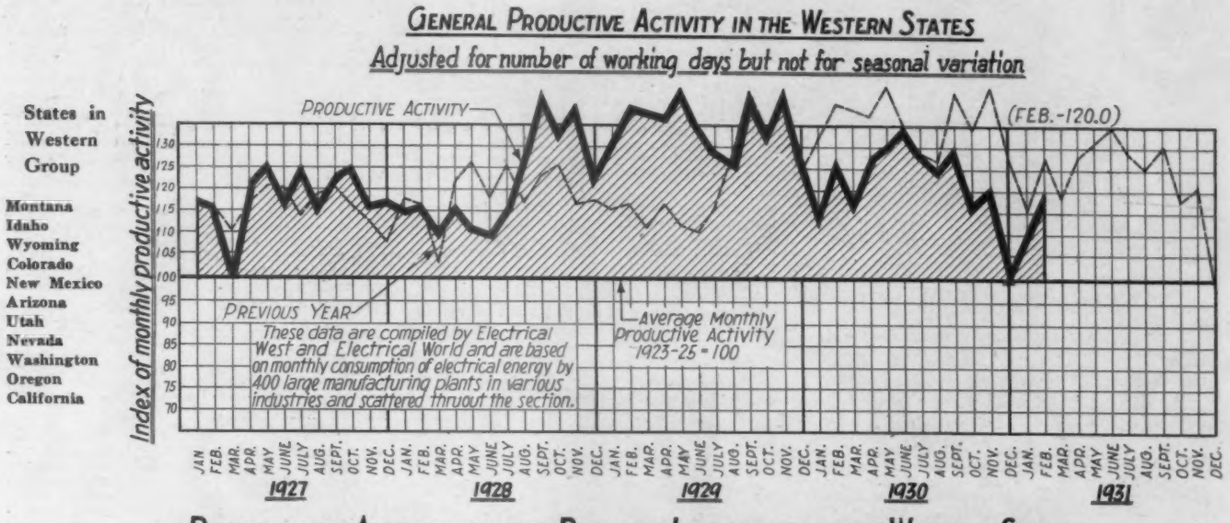
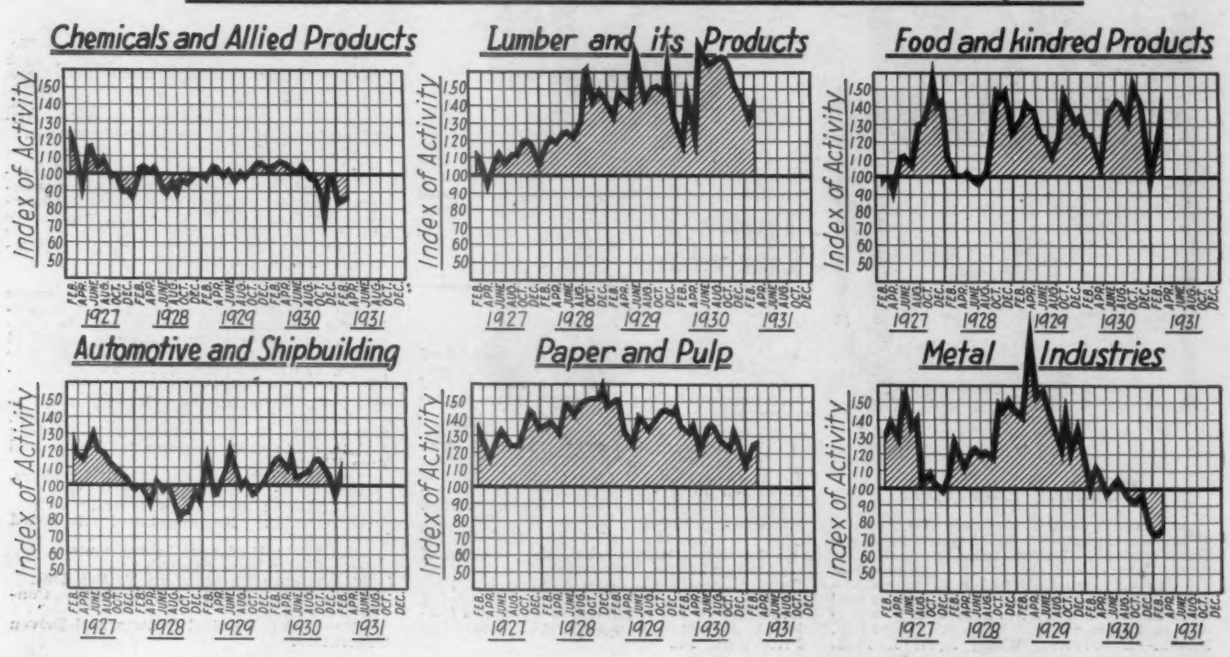
CONTINUATION of the rising industrial activity of the preceding month is evident in the returns giving electrical energy consumption in Western manufacturing plants for February. Based on these reports, the index is 20 per cent above that for December; in January it was up 11 per cent. The general level continues moderately below last year's, the difference in February being about 6 per cent.

The most conspicuous increases were in food products, 18 per cent; forest products, 6 per cent; rubber products, 10 per cent; stone, clay and glass, 12 per cent. While no group shows a recession, several continue to be decidedly lower than they were a year ago. The metals group has been low for months; it improved somewhat in February but the activity indicated is only two-thirds of what it was at this time in 1930 and less than half compared with 1929. The chemical industry is down 22 per cent, but rose 4 per cent from January.

Last year's indices are exceeded in foods, rubber, and in the earth products. In the last named the cement industry is an important constituent; the rise may indicate prospective construction. It should be stated that in the United States as a whole no industry group reached its figures for February, 1930. The situation in the Western states, compared with 1930, therefore seems more favorable than in the country at large.

Indexes of Industrial Activity in the Western States

(All figures adjusted for number of working days)

	Feb. 1931	Jan.* 1931	Feb. 1930	Average First Two Months 1931	Average First Two Months 1930
All industry	120.0	111.0	127.5	115.5	121.3
Chemical and allied products	85.7	82.4	109.8	84.0	108.6
Food and kindred products	149.3	126.0	126.5	137.9	125.6
Forest products	146.0	136.9	155.3	141.5	140.6
Metals group	74.4	71.6	116.4	73.0	105.4
Paper and pulp	128.3	126.0	130.6	127.1	133.9
Rubber and its products	173.0	157.0	164.0	165.0	169.0
Shipbuilding	.....	112.9	117.5	.....	117.2
Stone, clay, and glass	106.0	93.8	95.2	99.9	100.8

* Revised.